FOOD PROBLEM IN INDIA IN GENERAL

AND

IN KOLHAPUR STATE IN PARTICULAR

BY

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INTRODUCTION

India is faced with acute food-grain shortage since 1942–43. The prices of food-grains from 1940 to 1947 rose by about six times. The crisis is aggravated since last year by the shifting of population from Indian Dominion to Pakistan and vice versa, due to the unfortunate division of the country into two dominions. While the shortage of food-grains is intensifying, the rapid increase of population is making the food-problem more difficult.

Perhaps no other calamity has, during the last 250 years shaken India from the poor to the rich as has the present acute shortage of food-grains. Though the devastations of property and life, brought about by the unfortunate division of the country, are too bad and are experienced by lakhs in the country, there are many parts with large numbers who have escaped these devastations. But there is none throughout the length and breadth of the country who is not affected by the shortage of food-grains. Every one understands the meaning and implication of food-grain rationing, and the lower middle class and the poor cannot forget the effects of American maize and milo; while Bengal cannot forget for one or two generations the absolute starvation and consequent deaths of thousands. It is hoped that Government and the leaders will not forget the hunger lessons that we are learning.

Shortage of food is not a new phase in India and cannot be said to be due to the recent World War alone, though the World War and its after-math brought it to head. Either as a member of a farm family or as Deputy Director of Agriculture and Professor of Agricultural Economics, the author can claim first hand knowledge of what the ordinary peasant eats and how he lives. In this book he has attempted to portray the food conditions as they exist in rural areas, especially in Western India and has made general suggestions to improve the food situation.

The literature on food and production and consumption of food-materials is scanty; while the available statistics are far

from satisfactory. Most of these are misleading. If Government had reliable statistics of production and requirements of food-grain, they and their food-supply officers could surely have managed procurement and distribution much better. In this respect the analysis and comments, offered in this book will, we expect, be helpful in revising the long time average estimates of grain-production returns, prepared by Provincial and Central Governments. There cannot be more opportune time for such a work than the present, when food Ministers are handling the figures of production, imports and requirements.

The book is divided into four parts. The first part deals with the problem and the food-situation and dietary conditions in relation to different classes of population in the country. The inadequacy of the present local supply, the deficit at present and in 1971 are discussed in this part. The second part deals with the food-production of Kolhapur State, with reference to the past, present (1947) and the future (1971). In the third part, comments are offered on the ways and means of increasing food supply and suggestions are made to step-up production. In the fourth part are given appendices bearing on the text and on the tables appearing therein. Instead of burdening the text with details and subsidiary tables, they are given as appendices in a separate part (i. e. Part IV).

The present book is an attempt to analyse the food-problem and clarify the food-situation in the country, especially in the Kolhapur State. Rather than depend on general impressions, created on him by this and his previous investigations, the author has tried to verify his impressions with the aid of statistics and records.

Among the many books referred, the following are more freely used:—

(1) Major Graham's Statistical Report of Kolhapur 1854,

(2) Dr. W. Burns' Technological Possibilities of Agricultural Improvement in India 1944, and

(3) Health Bulletin No. 23 of 1938 by Dr. W. R. Aykroyd.

Thanks of the writer are due to the authors of these and other references.

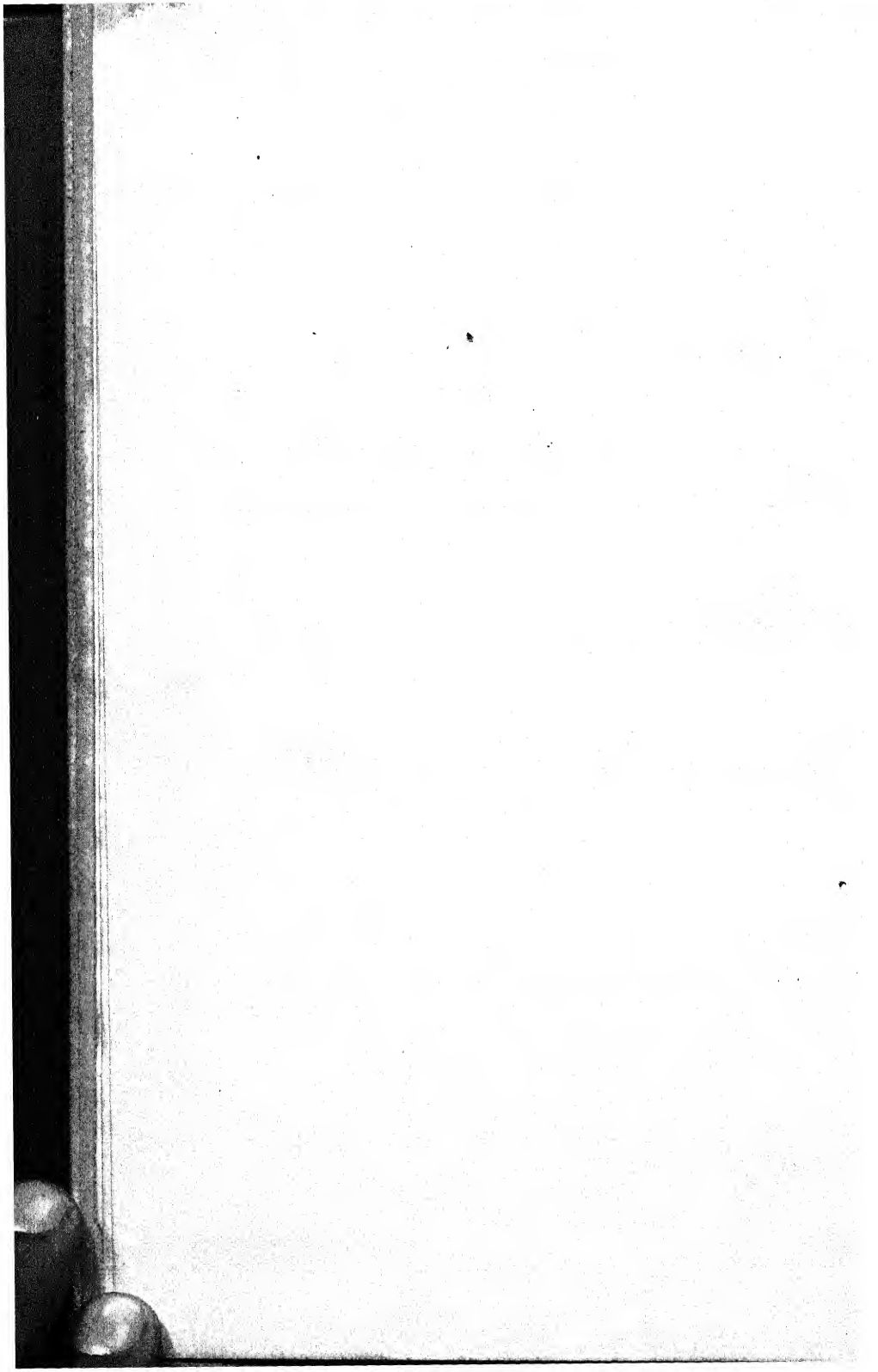
The author has made use of some of the material he collected for "The Statistical Atlas and Economic Resources of Kolhapur State" and has utilized the services of the staff given to him for preparing that work. He gratefully acknowledges with thanks the facilities given to him by the Government of His Highness the Chhatrapati Maharajasaheb of Kolhapur. In the compilation of the statistical material, Mr. S. G. Patil, B. Ag. of the Agricultural Department and Mr. P. S. Bhosle, M. A. a post-graduate student were found very useful.

Author's special thanks are due to the Hon'ble Mr. N. V. Gadgil, the Minister for Works, Mines and Power, Government of India, for supplying information on the imports of food-grains into India.

If this book helps to rouse interest of the public and of the Central, Provincial and State authorities in solving the urgent and vital problem of stepping-up food-production, the author will feel amply rewarded for this small contribution of his.

Tarabai Park, Kolhapur,
September 1948

P. C. PATIL



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FOOD PROBLEM IN INDIA IN GENERAL AND IN THE KOLHAPUR STATE IN PARTICULAR

General

We have attempted, in these pages, to place before the readers, the food problem in India in general and in the Kolhapur State in particular.

It is perhaps not unlikely that some of the Indian readers may not have even a general idea of Kolhapur, its situation, rainfall and soil. Similarly, the foreign readers, whose countries have been supplying food-grains to India, may not have an adequate idea of India's climate, rainfall and lands. It is, therefore, proposed to give a short general description of India and the Kolhapur State.

India

Location.—India is a part of the Central Asiatic Continent projecting into the Indian Ocean. India extends from 8° to 37° North latitude and from 61° to 101° East longitude. It is separated from the rest of Asia by the great Himalayas on the north and north-west, by the Arabian sea on the west and by the Bay of Bengal and Burma in the east and the Indian ocean in the south.

On the north, in the Himalayas, the altitudes are very high, varying from 12000 to 16000 feet, some of the peaks being 22000 to 28000 feet high above the sea level. These peaks are clad with snow and have very low temperature. The Indo-Gangetic plains are low and their altitudes vary from 100 to 1000 feet. The climate of the Indo-Gangetic plains is very cold in winter and very hot in summer. South of the Vindhya and the Satpura ranges in the Deccan plateau, the altitudes vary from 1000 to 2000 feet. In the west of the

Deccan plateau, in the Sahyadrees, the altitudes vary from 2000 to 3000 feet.

Rainfall.—Rainfall varies from tract to tract. Most of the rainfall is received from the South-West Monsoon from June to September. The retreating or the North-East Monsoon rains are received in October, November and December. South-West Monsoon provides more rainfall in the Western ghauts and in the maritime part of Bengal; while the North-East Monsoon provides rain along the Bay of Bengal and to the Gangetic plain.

Though the average rainfall of the country may be 45 to 50 inches, it is hardly 5 to 6 inches in Sind, and 9 to 10 inches in North-Western parts. It is 30 to 40 inches in Hyderabad State, Central provinces, United provinces and Central India; 80 to 100 inches in the Konkan and Maval and 100 to 200 inches or more in the Sahyadrees and Himalayas. There is besides, a scarcity-rainfall tract in the East Deccan. It is about 300 miles East-West and 500 miles North-South, where rainfall varies from 16 to 30 inches. The soils in this tract are good but they cannot produce much, for want of rain.

Soils.—In the Indo-Gangetic plains, soils vary from sandy to rich-alluvial loamy. In the parts lying higher in Sind and Thar, they are sandy, and along the rivers and in the plains loamy. In the mountainous tracts of the Himalayas, Sahyadrees and Vindhyas soils are thin and poor. In the Peninsula generally, and especially in Berar, Central Provinces, Central India and in Khandesh, the soils are deep black. The average area under crops comes to 208·8 million acres.

The population of India in 1941 was 388·9 millions. The density of population comes to 215 per square mile.*

Kolhapur State

It is a Premier State in the Bombay Presidency and is ruled by His Highness the Chhatrapati Maharaja. It is a part of the Hindu Kingdom founded by the Great Shivaji, in the second half of the 17th century A. D.

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* The Indian Rural Problem by Sir Manilal and Anjaria.

Situation.—The State lies between 17°10' 45" and 15°50' 20" North-latitude and 74° 44' 11" and 73° 43' 16" East-longitude. It lies in the middle of the three districts—Satara in the north, Ratnagiri in the west and Belgaum in the south and east, in the Province of Bombay.

Excluding the out-lying divisions of Raibag and Katkol-Torgal, the State forms an irregular belt in the Deccan plateau. This irregular tract stretches along the east of Sahyadree mountain for about 70 miles, from Chandel in Vishalgad Jahagir to Prachitgad in Bhudargad Peta and is 8 to 80 miles wide from west to east in different parts. The isolated divisions of Raibag and Katkol-Torgal are surrounded by the talukas of Belgaum district and by some of the Deccan States.

Altitude.—The main part of the State is traversed by the Sahyadree in the west. Six main spurs of Sahyadree sprawl in the east. The altitudes in this range are high. Some of the forts are 3000 feet above the sea-level. The main part of the State is 1800 to 2000 feet above the sea-level.

Rainfall.—The State lies in the rain-shadow of the Sahyadree, which stands prominent on the western boundary. Most of the rain is received from the South-West Monsoon, between June and September. As the current passes east-ward, most of the fall is arrested by the high wall of the Sahyadree and consequently the amount of rainfall in the western hilly belt is as high as 100" to 200"; some peaks getting as much as 300 inches. The second belt, next to the hilly belt, gets 50" to 80", the third gets about 30" to 40" and the fourth or the eastern-most belt, consisting of the isolated divisions of Raibag and Katkol-Torgal, gets only 18 to 19 inches.

Soils.—The soils in the western ghauts and along its spurs, running in the east, are light and shallow, growing rice and hill-millets. In the maval or the second zone, they are of medium depth growing rice, groundnut, early *kharif-jowar* and sugarcane. In the *rabi* season, rice-lands go under pulses. The third zone has deep black soils which grow late *kharif-jowar*, tobacco, chillies and also sugarcane. The fourth has deep soils along rivers and shallow in the planes. They grow *bajri* and groundnut, some, *jowar* and wheat.

The total surface area of the State is 3,229·5 square miles. The population in 1941 was 10,22,046 and was estimated at 12,10,000 in 1947. The density of population was 338 per square mile in 1941.

About 43 to 44 percent of entire area or about 9,24,000 to 9,25,000 acres is under cultivation.

PART I

FOOD PROBLEM IN INDIA

CHAPTER I

FOOD PROBLEM AND ITS IMMEDIATE AND DISTANT CAUSES

India has for a long time been a deficit country. It has to depend for food-grains on surplus countries. As a result of the recent world war, transport of food-grains by sea became very difficult. At the same time there was a partial break-down in cultivation in surplus countries. The result was, India had to face a very bad famine in Bengal and a general scarcity all over the country, especially in Madras, Travancore, Cochin and Bombay.

Food situation in the country is accentuated further by a break-down in the normal village life and secondly by the non-cultivation of land, consequent upon the division of the country into India and Pakistan. The country's partition and the strained relations between the Congress and the Muslim League necessitated large scale transfer of the Hindu and Sikh population from Pakistan provinces to Indian provinces and of the Muslim population from Indian provinces to Pakistan provinces. The enormous difficulties of transferring large numbers (well over 40 lakhs on each side) and providing them with food, while on the line of march and in evacuee camps, became unimaginably difficult.

It is true that the war and its effects precipitated food crisis. In 1938 very few realised the problem of the shortage of food in the country. Food difficulties in India could not have been postponed for a long time, even if the war had not intervened. The basic cause of the food shortage is the enormous increase in population. The land under cultivation has not appreciably increased during the last 50 years nor have the Government and the people taken advantage of science, power and machinery to improve the land and to produce more food from the land under cultivation.

If the population increases at the present rate (i. e. about 10 percent every decade) without improving resources and

increasing the food supply, Malthus' law of population must work and excess population starve or diminish due to epidemics.

When the population of the country was small and when people were complacent as regards their insufficient food and clothing, India did not import food-grains due to poverty and lack of transport. On the contrary, she used to export small quantities of wheat to Europe, although it cannot be said that wheat was surplus. It was exported because it fetched better price. The Famine Commission in 1880 calculated the annual production of food-grains in India at 52 million tons and the consumption at 47 million tons and showed a surplus of 5 million tons. This production of 52 million tons, however, does not seem to be reliable. In 1880, sufficient material for calculation was not available and the present checks due to food-control did not exist. With the increased area under cultivation and under irrigation even in 1944, the production is put at 51·5 million tons. (Food situation in India, 1944 edition, Government of India publication page 51). The country may be considered just self-sufficient as regards food-grains in 1880.

By 1898–99 Burma rice made its first appearance in India. During the years, immediately preceding the recent World War, the annual imports of rice from Burma had reached 1·5 million tons costing about Rs. 37 crores. *

The average annual imports of food-grains alone during the two years 1946 and 1947 came to 2·3 million tons worth about Rs. 85 crores. † It should, however, be noted that during these years Burma rice was not coming. It should further be remembered that the prices of food-grains have risen about three times over the pre-war prices. According to Government of India's recent calculations§ the country

* Hindustan Times of 28–12–1947.

† The information was supplied by the Ministry of food, Government of India, through the kindness of the Hon'ble Mr. N. V. Gadgil, Member of the Council, Works, Mines and Power.

§ Annual Progress and Programme Report for the year 1947 of the Government of India to the Food and Agriculture organization of the United Nations, page 5.

will be required to import over 4 million tons of cereals from 1st January 1947 to 31st December 1947.

Unfounded notions

Before coming directly to the food-problem, it seems desirable to dispel the unfounded notions which are current among the uninformed and conservative people. They think that there is any amount of cultivable land in India ; that the land in India is more productive than the lands in other countries ; that as there is a sufficient amount of rainfall and that the seasons—Summer, Monsoon and Winter—are favourable for crop-growth, there should be an abundance of crop. It is also believed by many that the present population is not excessive for the available land.

Let us consider these notions dispassionately, through the eyes of economists and scientists and not be led by only patriotism and sentiment. Mere sentiment and patriotism, without basis, cannot change the natural conditions of a country.

It may be noted that India is an agricultural country from immemorable times and that the amount of the cultivable land is not sufficient to support her large population. It should also be remembered that the average lands (the term land includes other natural conditions as climate and rainfall) in India are not superior to the lands in many other countries. In general our lands are, in fact, inferior to lands in the western part of Europe, southern part of the United States of America and the lands in Japan, Java and lower Burma. It is true that the soils in some parts of India are really rich ; but this cannot be said of all parts of India. Whereas the soils in the Gangetic-plain, Malva, south Gujerat and in some of the river valleys are deep and rich, those in the North-West, Rajputana and in the high altitudes of the Himalayas, Vindhya and Sahyadrees, are shallow and poor.

Though the average rainfall of the country seems to be more than sufficient, its territorial and seasonal distribution is very irregular. In the high altitudes of the Himalayas in the North, and of the Sahyadrees in the South-West, the annual

average rain-fall is 100 to 200 inches or more; in some parts of the North-West and in Sind, it is less than 6 inches and in the large scarcity-tract of the peninsula it is hardly 16 to 30 inches. Another important factor relating to our rainfall is that its seasonal distribution is unsatisfactory. Rainfall in India is restricted to three to four months and its intensity is high. It comes in heavy showers and naturally most of it runs to the sea through rivers and streams. The land does not get sufficient time to absorb the water.

We, therefore, cannot accept the hackneyed statement that the land in Aryawart (India) is the best in the world and that it is *suvarn bhumi* (golden land). It is true that we can change nature (i. e. land, climate and rainfall) but little and have not only to be satisfied with what we have got, but we must improve the land by hard labour with the help of science and with all the enthusiasm at our command.

We do not consider that there is sufficient land for the population. The following extract from a bulletin* gives the area under cultivation, per head of population, in different countries. There may be slight differences by now due to changes in population; still they will give a fairly good idea of the comparative area under cultivation per head of population.

	Acres
United States of America	3·5
France	1·5
United Kingdom	0·4
Japan	0·3
India (as a whole)	0·8
Bombay presidency	1·53
Kolhapur State	0·84

The area under cultivation per head in Kolhapur State is an average for the years 1940 to 1945 and is added to the extract from the bulletin referred to above.

Except Japan and the United Kingdom, India has less cultivated area per head. It may be noted that Great Britain and Japan are highly industrialised countries and they live

* Bombay Department of Agriculture Bulletin No. 109 of 1921. The crops of the Bombay presidency with their Geography and Statistics by Dr. P. C. Patil, Deputy Director of Agriculture.

more on industries than on agriculture. These countries also feel the shortage of food as we do.

Too much population for the land

The population of India is rapidly increasing. From 1921 to 1941, it has increased from 318·9 to 389 millions or by 22 percent. During this period, the density of population increased from 203·3 to 245·9 per square mile or by 21 percent. (The figures of area are taken from the statistics appearing in "Recent social and economic Trends in India by S. Subramanian 1947").

The question of food in a particular country or even in a district depends mainly on the extent of its population and the amount of land. Agricultural conditions and the system of cropping remaining unchanged, if the population increases the total yield of the agricultural products cannot increase much. Naturally the share of produce per-capita becomes smaller as the population increases.

CHAPTER II

AGRICULTURAL STATISTICS IN INDIA ARE CONFUSING

In an investigation like the present one, the statistics of land utilization for different purposes (as cultivated area, current fallow, forest, cultivable waste etc.) and kinds and quantities of agricultural production are very important. The available material, however, is not satisfactory though we have to make use of what is available.

Basis of the Central and Provincial statistical tables

The basis of the land statistics in India are the returns which are compiled by village officers. The village officer has little idea that the figures, recorded by him, are the basis of very important statistical data of national importance. The village returns are put together at the taluka and district headquarters by subordinates with little acquaintance with statistical methods and much less appreciation of statistics.

Omission of the cultivated area in the forests vitiates crop statistics and estimates of area and yield

The forms designed for village-returns, being mostly concerned with land-revenue, deal with assessed lands. They do not take note of the cultivated area in the forest which falls in the category of "unassessed" lands. This is a handicap in trying to get at the total produce.

Difficulties of the Government of India in preparing Agricultural Statistics of the country

The Central Government suffers from several other handicaps. Some of the provinces like Assam, Bengal, and Bihar do not submit regular crop-returns. Many Indian States do not supply statistical returns at all and hence the Central Government has to form its own estimates.

In the absence of general soil survey, it is not possible to say which land is cultivable-waste and which is uncultivable and yet the area has to be entered in one group or the other.

Defective terminology causes confusion

Apart from these defects, the terminology adopted by the British officers, is unintelligible and is not suited for Indian conditions. These officers seem to have adopted the terminology on the analogy of the system in England, where one part of the farm (holding), remains under crops and the other is fallowed. The fallow remains under grass for 6 to 20 years, before it is opened for crops.

With us in India (especially in Western India), all the good arable-land is under crops. Hardly is any good land fallowed for rest. Only in the forest villages, where shift cultivation has to be practised, up-lands are cropped for 4 to 6 years and then left uncultivated till they recuperate and gather soil. In such villages the rest of the thin land, on the hill-sides and the up-lands elsewhere, are permanently under grass (natural poor grass) or grazing. Some of the low-lying lands which get flooded during rains have to be kept under grass, which generally is of a good quality. These are practically the permanent arrangements and not in the course of fallowing and yet these grazing and grass areas are returned as "Fallow" according to the present practice. It would have been better if the designers of the village forms, had added another heading such as "grass lands".

We have no first hand knowledge of the up-country provinces and States where for want of irrigation or insufficiency of rainfall or shortage of labour, arable lands, not opened for cultivation, might be rightly included as cultivable waste and even included in fallow.

In the circumstances, it is very difficult to find the extent of the land available for extending cultivation in the whole country.

We will try to show how the terminology adopted by the British officers, causes confusion, by quoting the land-statistics of India from "Indian Problem" page 32, by Sir

Manilal and Professor Anjaria who have taken these from Agricultural Statistics of India.

Land Utilization

The following gives the acreage in millions, under different categories as named by the designers of village forms and provincial statistical tables :—

278	Million	acres	under	cultivation
60	,,	,,	,,	"current fallow"
87	,,	,,	,,	Forest
117	,,	,,	,,	"not available for cultivation"
116	,,	,,	,,	"cultivable waste"
658	,,	,,		Total acreage.

From the above, one generally concludes that India still has 116 million acres available for cultivation, in addition to the 60 million acres fallow. Such is not the case as will be seen from the following rearrangement of Sir Manilal's figures. The figures are in millions. The italics are ours.

(A)	Assessed land			338
	(a) Net cropped area or land under cultivation		278	
	(b) Fallow (*which includes grass and grazing*)		60	
			338	
(B)	Unassessed land			320
	(a) Not available for cultivation		204	
	(i) Forest	87		
	(ii) others	117		
		204		
	(b) "Available for cultivation" (*which really is village common*)		116	
			320	
				658

116 million acres shown in the Government figures as land "available for cultivation" misleads one to believe that substantial acreage from this will be available for further cultivation; but that acreage in fact being "village common" it is only from the 60 million acres (A b) termed "Fallow" (which in fact are mostly grass lands) that some quantities of arable land can be found for cultivation. At any rate this is the condition in Western India. Perhaps in Northern and Central India there may be fair amount of good land in one or the other two groups "fallow" and "culturable waste". **For the size and population of India we do not think there is much scope for increasing the area under crops.**

Indian farm has a different meaning from an English farm

Both the terms "fallow" and "holding" are very loosely applied to India. The term fallow gives rather a bloated conception of the size of the Indian farm. The term "holding" or "farm" as used in Europe and America is not suitable for India. In Europe and America, beef, mutton, pork, fowl and milk are more important food-materials than cereals and pulses.* With us, on the other hand, cereals and pulses form our main food. Mutton, fowl and even milk are subsidiary food-materials. Hence, unlike in Europe and America, the term 'holding' or 'farm' carries little meaning in India as regards food production. The real farm of the Indian farmer is that part of his holding which grows grain and vegetable products. In most parts of India, the real or crop-growing-farm is very small. It may, therefore, be remembered that the average holding (including grass and grazing area) is very small and the crop-growing-farm is still smaller. We have no material to find the percentage of the area under grass

* According to Gray and Baker (year book 1923 pages 481 and 482), in the United States of America cereals form only 14 percent of the total food ration, the remaining 86 percent being provided by animal foods and vegetables. They also say that 40 percent of the callories in the ration are provided by animal food.

Our study reveals that in India cereals form over 62 percent of the ration and supply 80 percent of the callories, while animal foods (including milk) supply 5 percent, remaining 15 percent being supplied by oils, sugar, vegetables etc.

and grazing to the total area under holdings for India. In a careful inquiry in Kolhapur State, it is found that out of the total area of 15,00,544 acres in holdings, 5,75,896 acres (called 'fallow') are permanently under grass or grazing. It means nearly two third of the holding only, is a crop-farm in Kolhapur State. The "fallow" being either poor or unsuitable for cultivation, the farmer cannot withdraw much from it to increase cultivation.

Difficulties in estimating total crop-production of the country

In an investigation of food-problem of India, one must know how much food-grain is produced in the country. For this purpose, one has to turn to the crop-cutting experiments. For the varying conditions in the vast country, the number of experiments is always too small and the estimated amounts of produce of different crops, do not come nearer the actuals. Moreover, such estimates are generally liberal. During recent years, fairly accurate figures, about the consumption of food-grains in the country and the figures of import, are available which show that in the past the per-acre out-turns and the total food-grain produce of the country were over-estimated. (Appendix A)

Necessity of improving land and crop statistics

In the circumstances, we have to remember that the statistics used cannot be said to be accurate and reliable. They, however, give a fair indication of the general trend.

We hope that the proper authorities take steps to adopt measures to improve and correct land and crop statistics.

CHAPTER III

POPULATION IN RELATION TO FOOD-GRAIN SUPPLY IN INDIA

Population in relation to food supply

The question of population in India in relation to its food supply needs very serious thought. While the population of British India rose from about 231·6 to 295·8 millions or by 28 per cent, the area under cultivation rose from 202·6 to 214 million acres or by 5 per cent only, from 1911-12 to 1940-41. Another important fact one has to remember is that during this period the area under major food-grains (rice, wheat, *jowar*, *bajari*, barley, maize and gram) increased from 150·5 to 156·5 million acres or only by less than 4 per cent. One thus sees that the increase in population is much greater when compared to the increase in cultivated area and especially the increase in the area under food-crops. Even the small increase in the cropped area was largely usurped by the cash-crops.

At the same time, one has to remember that the out-turn of food-grains per acre did not increase. The reasons of low yields are the shortage of manure and irrigation to food-crops; the cash crops like sugarcane, jute, cotton, groundnut, tea, coffee etc. receive more attention of the farmer.

Production of food-grains and their deficit

For want of reliable statistics, the calculations of the production of food-grains differ very widely. We have not attempted such calculations for the whole of India. We have attempted to work out the production of food-grains, and its deficit in Kolhapur State which will be found in Part II.

On the basis of Dr.W. Burns' calculations in his note on "Technological possibilities of Agricultural Development in India, 1944", the total production of food-grains comes to 73 million tons a year. (The actual calculations will be found in

appendix A) Sir Manilal Nanavati and Professor J. J. Anjaria's per-acre out-turns (given in the Indian Rural problem page 34) are even higher than Dr. Burns'. We think that Dr. Burns' estimates are too high and not obtainable under the present conditions.

Dr.W. Burns, in his note referred to above, works out the annual total production from the acreage under crops and their average production per-acre. This is the proper way, provided statistics are fairly accurate; but they are not; and hence, in the light of the experience of food-rationing and the actual imports of food-grains during recent years, we propose to work the other way round, calculating the consumption of food-grains at one pound per adult (or per consumption-unit). The annual consumption figure minus the annual imports should represent the annual production.

Population and consumption-unit

The population of India in 1941 was 388·9 millions. Taking decennial increase at ten per cent, the population at the beginning of 1947 may be taken at 412·2 millions, or 345 million consumption-units. (There are generally 29 children, from 1 to 10 years, for every 100 population and on an average 16 children require as much food-grains as 7 adults.) Therefore 29 children* should require as much food-grains as 12·7 adults. For every hundred population (consisting of 71 adults and 29 children) therefore, the number of consumption-units comes to 71+12·7 or about 84.

Deficit of food-grains; present and past

At one pound of food-grains per-day per-adult (or per consumption-unit), the consumption of food-grains comes to 56·2 million tons a year. The average annual imports of food-grains, for 1946 and 1947 according to the figures supplied by

* According to 1931 census, the number of children below 10 years comes to 29 percent; those below 5 years 15·2 and those between 5 and 10 years 13·53 percent. H.A. Yevale "Maharastra student" page 21 and Census Report, 1931 Kolhapur and S.M.C. States Table VII Part A page 64.

the Food Department of India† come to 2·3 million tons. Therefore, the food-grain production in the country should be about 53·9 million tons (56·2 million tons consumption minus 2·3 million tons imports).

Taking 2·3 million tons of annual food grain imports and 56·2 million tons of production, the grain-ration comes only to 16 ounces per head (or rather per consumption-unit) per day which quantity is not really sufficient. It means every 4 out of 100 persons are dependent on imported food-grains which condition is very unsatisfactory for an agricultural country like India.

It can be said that from about 1898–99, the deficit of food-grains in India is increasing and that the lower strata of population is not getting sufficient food. When prices of food-grains were lower, the rich in those days got what they wanted; in fact they had a good time since little money could bring even luxuries at cheap prices. The condition of substantial farmers was not bad and though they could not make much money, they had sufficient food to eat. The condition of the masses, however, was far from satisfactory. There was

† The following is the extract from a statement showing imports of different food-grains into India supplied by the Ministry of Food, Government of India, vide their letter dated 14–2–48. The grain is in '000' tons and Rupees in lakhs. Period, quantity of import and the approximate cost, including freight upto Indian ports are given below.

	Year 1946	Value	Year 1947	Value
Rice (in husk)	44		10·4	
Rice (not in husk)	311		475·4	
Wheat	1,234		659·8	
Wheat-flour	161		192·4	
Barley	132		211·6	
Millets	118		532·0	Includes milo
Maize	306		238·4	
Oats	24		8·2	
	2,330	7,627	2,328·2	9,379·2

The average of the two years comes to 2·3 million tons and value 85 crores of rupees. The expenses incurred in India on clearing of food grains from ships, cost of gunnies, internal transport and administration are not included in the value.

no hue-and-cry raised, the reason being that the half-starved masses and their leaders had to acquiesce in the then prevailing political conditions.

Natural effects of growing population

Even before the British assumed Governance of the country, the production of food was small in relation to the population, although there was no scarcity of good land. Land was there; but it was not opened, there being no peace and no security of harvest. Government should have, as soon as peaceful conditions prevailed, taken up the question of land reforms and improvement of agriculture; but they did not.

In Europe, however, the question was taken up by the middle of the 18th century and many laws were passed with a view to improving agriculture and agricultural productions. Malthus, an English economist, propounded in 1798 the famous law stating that "While food production increases by arithmetic progression, the population increases by geometric progression". He based his inference on the conditions then prevailing in Europe. His statement was criticised by other economists who maintained that under the changing conditions, subsistance, too, was also increasing and that man was looking after his responsibilities and that there was no cause for any alarm. With all the progress of science in producing more food and other necessities of life, and all the growing consciousness of responsibilities on the part of the people, the increase in the production of necessaries is lagging behind the increase of population even in Europe.

Conditions in India are far different. There is very little possibility of increasing cultivation. Natural resources are not developed and very little provision is made for irrigation in dry tracts and the potential water-power is hardly touched. The land policy in many provinces is still in medieval stage. Education is very backward and the masses cannot be expected to think of the responsibilities of growing families. The increase in population is enormous and it is likely that it will go on increasing, whereas most of the good land is already

under cultivation. In our opinion, there is no possibility of increasing the area under crops, unless the poor lands are developed and irrigation provided.

The chronic insufficiency of food supplies, recent famine in Bengal and the present difficulties in securing food-grains all over the country, make one feel that under the existing conditions Malthus' law holds good, in the twentieth century at any rate in India.

The natural effect of growing population is the shortage of food and other necessities of life and consequent lowering of the standard of living, which is already very low. The pressure on land is making the small holdings still smaller and uneconomic. Uneconomic holdings do not offer scope for the employment of capital and managerial ability and cultivators cannot produce, area for area, as much as on economic holdings. The natural result is lower production in agriculture than is possible from the available land.

Apart from the shortage of cultivable land and the tendency towards increase in population, the masses in India are illiterate and consequently backward in their social outlook. Till very recently, child marriage was a rule. Very few, and those only who have received education, realise the responsibility of large families. But the educated form only a small part of the population. With the present slow progress of education, it will take years before the masses realise their responsibility and adopt measures to restrict the size of family. In an agricultural country like ours, the first and the immediate remedy, against indiscriminate increase in population, is the spread of education.

The lower standard of living has further deteriorated the general health of the masses. Birth rate is very high, and so is the death rate. The infant mortality is alarming. The average tenure of life in India is very low being about 27 years, perhaps the lowest in the world. This shows the enormous loss of life.

To remedy the state of things, provision will have to be made for a larger production of food and cloth, improved sanitation and attempts to change the traditional attitude of the

public by means of popular literature on birth-control and making a free provision of birth-control measures. Changes in the law of succession, whereby land cannot be sub-divided beyond a certain minimum area are essential. The most important and urgent first step is to make education compulsory. Unless masses are educated, propaganda of any kind is bound to be ineffective.

It can be said that the present Indian agriculture is a way of living. To increase production and to make agriculture a business proposition, part of the agricultural population must be absorbed in industries, which means industrialisation of the country.

Before taking up the question of diet, it is proposed to discuss the effects of the socio-economic conditions of the people on the kind of food they eat.

Socio-economic conditions in India

Socio-economic conditions in India are very different from those prevailing in Europe and America. Beef, mutton, pork, chicken, fish and milk form important part of food-ration in those countries; cereals and pulses are more or less secondary. Reverse is the case in India. Grains form the bulk of the ration, vegetables are supplementary; meat, eggs and fish are forbidden in many communities and those who eat such, eat only occasionally. Why so? For the majority, in India, there is not much choice. For them the question of getting sufficient food of any kind to fill their bellies, is all important.

In ancient times Indians ate beef, mutton and wild game. The religious-minded philosophers later on considered it cruel to kill animals for food and they and their followers gradually gave up animal food except milk. Milk was never thought to be animal food, as the animal itself was not slaughtered. Unlike Muslims and Christians, the Hindus treat all life sacred and consider it a sin even to kill vermin. Some maintain that it is not good even to drink milk as it means depriving the calf of mother's milk. The late Mahatma Gandhi avoided drinking cow and buffalo milk on that ground. Though the Mahatma's lofty philosophy is not accepted as practical, the ancient

philosophy against eating animal flesh is accepted by a large majority of every class in India. Some communities like Jains, Lingayats and Brahmins (except the Kashmiri and Bengali Brahmins) abstain from meat-eating. The contact of Jains has influenced the Kshatriya and Vaishya communities in Gujarat and Malva and of Lingayats, in Karnatic, in this respect. Even the Marathas in the Deccan feel constrained in killing animals for food. As a result, even meat eaters partake meat only occasionally. The *Malkaris*, followers of a cult of saints of the Deccan belonging to all classes abstain from meat-eating.

It can be said that all Indians, except the Christians and Mohamedans are influenced by the Hindu Philosophy of the right of every being to live. As a result, some entire communities and many from others do not eat meat, eggs and fish.

Whatever merits animal food has, it has to be admitted that the non-meat-eaters are not in any way inferior, in body or mind, to the meat-eaters. Amongst wrestlers, for instance, the *Chobes* of Mathura are not inferior to Punjabi Mohamedan wrestlers. The Brahmins and the Jains of the Deccan, who are vegetarians, are not a whit inferior to any other community in their intellectual capacity. Even milk does not seem to be quite indispensable for man. There are no cows and buffaloes in Japan and yet the Japanese have proved that they are as good fighters, scientists and diplomats as any.

There is another important contributory reason against eating animal food. Meat and milk are more costly than cereals and pulses. It is said that it requires about six pounds of cereals to produce one pound of meat, and three pounds of cereals to produce one pound of milk. Apart from the financial considerations, it is well to remember that an unit of land produces two to four times the number of calories (or energy) in the form of cereals, than in the form of milk. Unit for unit, land produces more calories in the form of cereals than in the form of vegetables and fruit.

Under the present socio-economic conditions the solution of India's food-problem lies in increasing food-grains

We do not intend even to hint that India should discourage producing meat, milk, fowls, eggs, vegetables and fruit.

In India, cattle are mostly supported on straw of food crops and by grazing on poor lands which are unfit for cultivation. Except in cities, they are not stall-fed. Sheep are raised on agriculturally sub-marginal lands. Poultry farms are rare. Individuals keep a few birds which are allowed to pick what they can. Very little grain is given to them. Milk, meat and poultry concerns are more like subsidiary industries, neither necessitating withdrawal of much land from cultivation nor involving the use of much grain or money. As such, they deserve encouragement even on economic grounds.

In short, looking to the falling ratio of cultivated land in relation to population, it is necessary and desirable that India should produce more cereals and pulses than animal food. In other words, her diet should be composed mainly of food, giving high-calorie-return per acre of land.

CHAPTER IV

FUNCTIONS OF FOOD

Before proceeding further, it is desirable to know the function of food and its constituents and also the food requirements of persons of varying ages.

To keep going, to make-up for wear and tear, to keep warm and to provide energy, human body requires certain intake of food and water. The quantity of food alone does not mean that it contains the necessary body-building and energy-giving materials.

For this, it is necessary to know the essential elements of different foods and also the requirements of the body. The chemist has found out the percentages of important and essential ingredients of common foods ; while the physiologist has determined the quantity of each ingredient required by persons of different ages living under different conditions. Appendix F contains a table in which food values of different kinds of food are given. The important ingredients of food are proteins, fats, carbohydrates, also some mineral salts and certain vitamins. The important functions of these are given below.

Food-constituents

1. **Proteins** are needed for the growth and repair of the body. They serve as protectives of the system. No doubt, they generate heat too, but their main function is body-building and body-repair. Proteins may generate even more (say 5·6 calories per gramme) heat as against (4·1 calories per gramme) by cereals, but the most important function of the former is body-building.

2. **Carbohydrates** are essential for providing heat and energy for the body.

3. **Fats.**—Fats also are a source of energy and are said to be useful also in lubricating alimentary canal.

4. **Mineral salts.**—The functions of mineral elements in the body are manifold. They are essential for certain compounds of the soft tissue. They help to build and repair body and act as protective elements. Deficiency of certain minerals cause ailments.

Calcium phosphate.—It is required for bone-building and bone-repair. Traces of calcium are necessary in the blood. Phosphates are required for brain and nervous tissues.

Iron.—It is indispensible in the blood. Lack of iron necessarily causes anæmia.

Iodine, Sodium chloride and Manganese.—These are essential for the human system.

Vitamins.—They are protective substances and are necessary for the smooth working of the system, serving something like lubricants for engines. They have many complex functions to perform and serve as protectives of the system.

Vitamin A.—It is needed to preserve in a healthy condition the living membrane of the body and its cavities and the skin. Its absence affects the eye and makes the skin dry and rough.

Vitamin B.—It is necessary for nervous system and for blood circulation.

Vitamin C.—It is helpful in the blood and is found useful for the diseases of gums and joints.

Vitamin D.—It is needed for the bones.

Main sources of the principal food constituents.

Proteins.—Animal foods such as milk, meat, eggs, fish, also pulses, leafy and root vegetables and nuts are rich in proteins. Cereals also contain proteins but not much.

Carbohydrates.—Sugar, *gul* and starches are important carbohydrates. Potatoes, sweet-potatoes and honey are rich in carbohydrates. Cereals (rice, *jowar* and other millets) are main sources of carbohydrates. Animal foods and pulses

contain carbohydrates but their importance as body-builders is greater than as energy-producers.

Fats.—Milk, margarin, oilseeds and the coconut are the principal sources. Certain dry fruits contain fair amount of fat.

Mineral salts.—Milk, green vegetables, meat, fish and dry fruits are rich in minerals. Cereals and pulses contain small quantities. Maize, wheat and *bajri* are considered rich in iron; milk, *nagli* and green vegetables, in calcium; meat, eggs, fish peas and beans, in phosphorus and sea-fish in iodine.

Vitamins.—Green vegetables (especially cabbage and cauliflower) carrot, ladies-fingers, chilli, mango, papaya as also milk and milk-products, fish and eggs are rich in vitamins. The pericarp or the outer lining of the grain, just below the husk, contains vitamins. Sprouted pulses are also good in that respect.

Why is food required and how is the heat energy created in the system expended

In the last few paragraphs, we have given the kinds of food-materials and the functions of the essential food-ingredients contained in food-materials.

How much food and of what kind is required by persons of varying age, living under different conditions, is an important question which we propose to deal with in the following paragraphs.

Some may dispose of this question by saying that one might eat what he can get and as much as his appetite demands. This reply cannot be said to be entirely wrong. But the reply does not give us measurement of any kind. Science has now provided a measurement. Scientists have analysed the different kinds of food materials and found out the essential contents such as protein, fat, carbohydrates, mineral salts and different vitamins in these.

They have further determined the capacities of proteins, fats and carbohydrates to produce energy. How much energy or heat, a unit of each of the food-ingredients produces has also been determined by their calorific value. A food-calorie

is that quantity of heat which is required to raise the temperature of one kilogram (i.e. 2·2 lbs.) of water through one degree centigrade. Like coal or any other fuel, weighed quantities of these food ingredients are used in a particular apparatus to raise the temperature of a particular quantity of water and thus their calorie values are determined.

Vitamins and mineral matters are essential and though the attention of the dieticians is centered on vitamins, they cannot ignore the laws of the conservation of energy. Calories are just as important as ever, as they are needed to keep the body warm and to furnish energy for muscular work.

Since men and women of different ages, doing different kinds of work, require different amounts of food (producing different amount of energy), a word about the utilization and disposal of the energy is necessary to enable us to follow why one should require more heat energy than the other.

Heat generated in the body, by the oxidation of food-materials, is lost in various ways, such as

(1) Radiation, convection (or diffusion) and conduction from the body,

(2) Evaporation of sweat from the skin,

(3) Vaporization of water from the lungs,

(4) Warming the air that one breathes in,

(5) Heat lost in the excreta voided through urine and faeces

and

(6) Heat absorbed in the liberation of carbon-dioxide from solution in lungs.

Calorie requirements

A grown-up man, with a larger body has more skin area, lung area and greater chemical activities in the organs of the body than a grown-up woman and a grown-up woman loses more heat than a child. Naturally women require more food (the source of heat) than children and men than women.

Since the temperature of human body is higher than the usual temperature of the atmosphere, it loses more heat in the cold season than in the summer. It will lose more heat in cold regions than in temperate regions. While working, the body transforms energy into work. In the exertion, the body loses more heat, in the various ways referred to above and naturally one requires more food while at work. The transformation of energy into work and the loss of heat in several ways have to be replenished by supplying the body with food which is the source of energy.

The requirements of food, therefore, vary with age, sex, climate and the nature of work. The calorie requirements for persons moving about, without special work, are given below. (a) and (c)

Man over 14 years	2,500 calories
Woman over 14 years	2,100 calories
Mother-to-be	2,600 calories
Nursing-mother	3,000 calories

When at work they require in addition per hour of work (b)

For light work	0 to 75 calories
For moderate work	75 to 150 calories
For heavy work	150 to 200 calories
For very heavy work	300 and upwards

It is, therefore, clear that as a person works more and harder, he or she requires more calories. The following are the approximate calorie-requirements (c) per day for man and woman when occupied in work.

Man (156 lbs.)	*Calories*	*Woman* (125 lbs.)	Calories
Sedentary work	2,500	Sedentary work	2,100
Moderately active	3,000	Moderately active	2,500
Very active	3,300	Very active	3,000

(a) Nutrition bulletin No. 15 March 1946 page 12.

(b) Nutrition bulletin No.9 page 15.

(c) Nutrition bulletin No. 21, September 1946, page 16

According to "Nutrition in Health and Disease by Cooper, B. Sc., M. A., Barber, B. S., M. S., and Mitchell, B. A., Ph. D., United States of America" published in 1943, the basal rate of metabolism of an average sized man (154 pounds) is approximately 1,700 calories per day, while that of an average woman is about 1,400 calories. A man (175 lbs.) doing sedentary work may require 2,500 calories per day; while doing office work and other usual routine including 2 hours' walk and 2 hours' active exercise, the calorie requirements may be 3,275 per day. The same book gives the energy-requirements of some of the common occupations as under:

2,000–2,400 calories per day suffice for a shoemaker
2,400–2,700 calories per day suffice for a weaver
2,700–3,200 calories per day suffice for a carpenter or mason
3,200–4,100 calories per day suffice for a farm-labourer.

Men and women in India are of smaller and lighter build and in the hot climate they cannot do as hard and as heavy work as the Europeans and Americans do in their cold countries, and hence the calorie-requirements in India are expected to be smaller. Still the amount of food that our workers get is not sufficient for their health and work. More and well balanced food will lead to better health, efficiency and larger out-put of work.

More work means more calories and more calories mean more food. If a sedentary man in India requires 15 ounces of cereals and pulses (producing about 1,500 calories) and other food materials (producing about 1,000 calories) to make up 2,500 calories, he will require, when at hard work, 23 ounces of cereals and pulses (producing 2,300 calories) and other food materials (producing 1,000 calories) to make up 3,300 calories per day. This is not obtainable in our country under the present conditions.

The main purpose of this book is to assess the food-grain requirements and find their shortage in the country. Since food-grain requirements of children are smaller than those of adults, we have to turn the child-units into adult-units to assess the total food-grain-requirements of the country.

According to the Bulletin No. 23 of 1938 by Dr. Aykroyd (pages 2 and 17), the calorie requirements of children are as under:—

One year	...	...	800 calories
Four to five years	...	...	1,000 calories
Six to seven years	...	...	1,300 calories
Eight to nine years	...	...	1,600 calories
Ten to eleven years	...	...	1,800 calories

The calorie requirements per child, from one to ten years of age, therefore, may roughly be taken at 1,150. Food-grain-requirements of children of different ages are not available to us. Taking the grain-requirement of an adult at 16 ounces, the children from 1 to 10 years may require from 2 to 11 ounces, or on an average of 7 ounces of food-grains per child per day. It means the food grain-requirements of sixteen children are about the same as those of seven adults. The seven-ounce ration will provide about 700 calories; the difference between 1,150 and 700, about 450 calories is to be mostly met by foods, other than food grains, such as milk, milk products, *gul*, sugar, oils and vegetables.

CHAPTER V

FOOD-SITUATION IN INDIA

Before we discuss the food-situation in India, we have to turn the population including children into adult or consumption-units for finding out the total food-grain requirements of the country. The calorie requirements of a child and an adult vary and hence the population figure, given in the census reports, has to be turned into adult-units or consumption-units at 84 consumption-units per 100 population as already described.

In the foregoing pages, we have shown that in 1947 there were about 345 million consumption-units in India. These units, at one-pound grain-ration per day, should be consuming 56·2 million tons of cereals and pulses annually. The country is not producing more than 53·9 million tons a year and the deficit of 2·3 million tons had to be met by imports from the United States of America, Canada, Argentina and the South Eastern Countries in recent years.

According to the Food-Ministry of the Government of India, the country (before it was partitioned) imported on an average about 2·3 million tons of food-grains, costing about Rs. 85 crores a year. * This is the landing or naked price and does not include the cost of internal transport, storage and distribution and other overhead charges. Taking the cost of freight and distribution, the total cost exceeds 93·5 crores of rupees.

Moreover, it is doubtful if our suppliers especially the United States of America and Canada can and will like to stand inconvenience for us. Indeed, India is under obligation to the U. S. A., Canada, Argentina and the South Eastern Countries for having supplied us the much required food-grains. They, however, cannot supply such large quantities of grain

* The information was supplied by the Food Ministry Government of India through the courtesy of the Hon'ble Mr. N. V. Gadgil.

for very long. The population of these countries is increasing and their present yearly surpluses will be required by them in the near future.

It should also be remembered that the United States of America, Canada and Australia supplied food-grains because in the recent world-war, India was their ally and Indian soldiers had fought shoulder to shoulder with their soldiers. The grain supplies, moreover, brought to these countries fabulous prices.

The exports especially from the U. S. A. and Canada, however, mean less meat, pork, milk and milk-products in their food-ration. Will the rich countries lower their standard of living? Probably they will not. On the other hand India cannot afford to spend about hundred crores of rupees annually for the imports of food-grains. India, therefore, will have to grow on her soil all the food that she requires.

At any rate the position is clear now. The two dominions, India and Pakistan, have to face the situation and seriously consider the question of growing their own food without waiting for the doubtful natural adjustment. What they should do is a big question and does not fall within the scope of this work, which deals more with the Kolhapur State. We shall offer a few general suggestions in the closing paragraphs.

CHAPTER VI

FOOD-SUPPLY AND DIETARY CONDITIONS IN THE COUNTRY

We have now reached a stage when we should consider how the people, in the different economic groups of the population in India, are fed and whether the food obtained by them contains the necessary quantities of essential elements in proper proportion. This information is very necessary to gauge the food situation in the country and to examine the dietary conditions of its people, if improvements are to be made.

Dr. Aykroyd's general recommendations

In the Health Bulletin (No. 23 of 1938 page 15), Dr. Aykroyd has worked out the quantities of food-elements in the daily ration of a man doing light work, requiring about 2,600 calories. They are as under. We have only converted the grammes of protein, fat and carbohydrate into ounces.

Protein	73 grammes or 2·55 ounces	Calories 2,590
Fat	75 grammes or 2·64 ounces	
Carbohydrate	408 grammes or 14·37 ounces	
Calcium	1·02 grammes	
Phosphorus	1·47 grammes	
Iron	44.00 mgs. (milligrammes)	
Vitamin A	Over 7,000 International units	
Vitamin B_1	Over 400 International Units	
Vitamin C	About 170 mgs.	

Two balanced diets, containing the necessary food-elements sufficient to generate 2,590 calories, for sedentary workers—one for vegetarian and other for non-vegetarian—are recommended in Nutrion Bulletin No. 16 April 1946 on page 11, which are quoted below.

	Vegetarian ounces	Non-Vegetarian ounces
Cereals	14	12
Pulses	3	2
Leafy vegetables	4	4
Non-leafy vegetables	6	6
Milk	8	6
Fats and oils	2	2
Fruit	3	3
Sugar and *gul*	2	2
Meat and fish	–	3
Eggs	–	one egg

These diets are recommended as samples. The author says "You can divide this in as many meals as you like so long as the total quantity, during the day, is made up of all the items in the proportions given". He does not consider whether, in our present economic condition, this is possible. Elsewhere (Oxford pamphlet on India affairs, No. 21 of 1944), Dr. Aykroyd says that "Indian diets rarely conform to these samples".

Supply food-grains and other food-materials in India not adequate

It is not difficult to prescribe quantities of different food-materials for vegetarians and non-vegetarians, if the kinds and quantities are within the reach of the people and are available in the market. Under the present conditions, it is not possible to provide the variety and the quantity even for a modest diet to all people. The country is short of cereals and pulses. The country does not produce sufficient quantities of milk, oils, vegetables, fruit, meat and eggs. There is a large length of sea-shore but it is not fully exploited for fish. To produce equal quantities of milk, meat or eggs, one requires more land than for producing cereals and pulses. The former costs about six times the latter. Man can live without milk, meat, fruit and vegetables, but not without a minimum quantity of cereals and pulses. Hence, the country is required to import, at great cost, food-grains from over-seas.

In these circumstances, only the rich and the upper-middle -class can include fruit and vegetables in their daily food. The vast majority of the population has to supplement its meagre grain-ration with wild-fruit, wild-berries and wild-vegetables which could be gathered free in certain seasons.

Supply of food-materials in the country

We shall try to give estimates of food-materials produced in the country. To do this, it is necessary to have certain data which unfortunately is neither sufficient nor trust-worthy. One can find roughly the amount of cereals and pulses. Some data, though not reliable, of milk, meat and eggs is available. Still we shall try to estimate roughly the quantities of food

materials in the country and their average share per head (or per consumption-unit) per day.

Cereals and pulses.—In the earlier pages, we have estimated the supply of these at 56·2 million tons (about 53·9 million tons produced in the country and about 2·3 million tons imported). Taking the population at 345 million consumption-units in 1947, the average ration comes to 16 ounces per consumption-unit per day.

Oils.—During the pre-war period, India used to export oil-seeds, oil and oilcakes in large quantities. Since war broke out this export is stopped. Simultaneously hydrogenated vegetable-oil and soap industries started and the pre-war exports are absorbed in the country as people began to use more oil for human consumption and oil cake for cattle feed and manure.

The total production of edible oils-seeds, according to Dr. Burns is 2·5 to 3 million tons a year, the present average consumption of oil (including hydrogenated oils) per consumption unit per day comes only to 0·7 ounce. Perhaps before war it was less.

Milk.—"The Report on the Marketing of Milk in India, 1941" gives the average daily per-capita consumption of milk and milk-products at 6·6 ounces. Even this, to our mind, is a high estimate. In an intensive study of milk-production, in Kolhapur State, our estimate comes to only 2·9 ounces (see appendix D). We, therefore, assume the consumption of milk, per-head per-day to be 5 ounces.

***Gul* and Sugar.**—According to Dr. Burns (Technological possibilities of Agricultural Development in India 1944, statement 17) the annual production of *gul* and sugar in 1942–43 was 5·4 million tons while according to the "Annual Progress Programme Report for 1947 of the Government of India to the Food and Agriculture Organization of the United Nations" (page 9) the pre-war consumption of these was 4·7 million tons a year. Since there was no import or export of these in recent years, we might say that India at present produces and consumes about 5·4 million tons of *gul* and sugar. On this assumption, the consumption of these per head per day comes to about 1·3 ounces.

Vegetables and fruits.—In most parts of the country, for want of sufficient and well distributed rainfall, vegetables and fruits are not grown on a large scale. Where irrigation and transport facilities exist, fruit and vegetables are grown mainly to supply city demands. Very little of these are consumed where they are grown. Only the well-to-do people in the suburbs may be getting some of these. It may also be remembered that the villagers, unlike the city people, have not developed the habit of eating fruit and vegetables as a part of their diet. Only in the canal areas, where fruit and vegetables are grown on business scale, the area under them can be recorded. Out-side the canal-zones the area under fruits and vegetables is scattered. Moreover, it is practically impossible to form an estimate of their area and production. Their supply, on the whole, is not much and cannot be more than 2 ounces per head per day for the country. The poor people have, however, to remain content with wild fruits, berries and wild vegetables which they gather in certain seasons.

Spices and condiments.—Some kind of spices and condiments are necessary in Indian food. They differ in varieties and quantities from class to class, according to their purchasing power. Salt and chillies are indispensable ; onion, garlic, coriander, tamarind, turmeric, copra, cloves and asafœtida (*hing*) constitute spices according to the means of the consumer.

Meat.—(of sheep and goat). Dr. Burns, on page 13 of his Note on Technological possibilities of Agricultural Development in India, puts the sheep-population at 47·9 millions and goat-population at 37·6 millions. According to our inquiry with shepherds, a herd of one hundred sheep and goat, produces about eighty lambs, out of which sixty survive. Out of these 60, about 30 go to replace casualities and 30 are available for the sale of meat. From 85·5 million sheep and goats, therefore, about 25·6 million sheep and goats may be available for meat. The amount of meat per animal comes to about 20 to 25 lbs. The amount of meat, per consumption-unit, per day, comes only to ·08 ounce.

Eggs.—According to Dr. Burns, (page 114 of his note) the egg-production (of fowls and ducks) per head of human

population per year is 7·2. An egg of an average Indian fowl weighs 1·45 ounces. The average consumption of eggs per head per day, therefore, comes to 0·03 ounce.

India produces plenty of food-materials is a vague notion

There is a vague notion among many that the country produces sufficient quantities of different kinds of food-materials and that because of the improper distribution and the difficulties of transport, some classes cannot get enough of each.

This notion has recently been challenged because it is found that even the production of cereals and pulses is not enough to go round and that unless more food-grains are brought from outside, there would be famine and starvation. Many also think that since oil-seeds were recently exported there is enough oil in the country. Now-a-days, many think that with the large number of sugar factories and the large acreage under sugarcane, there is enough of sugar and *gul* for every man and woman in the country.

Let us take the case of oils and oil-seeds. There is perhaps a surplus of oil-seeds beyond consumption. This, however, does not mean a real surplus. It can at the most be said that the supply of oil-seeds is more than the demand for these. If, however, every one in the country were to get the necessary quantity of oil recommended by dieticians, the supply is not enough for all. If, all the edible oil-seeds are crushed, the total quantity comes to about 2·5 million tons of oil, which means only about 0·7 ounce per head per day against 2 ounces, necessary and recommended. The same is true of *gul* and sugar whose supply is considered sufficient for all people. But the facts are otherwise. The total production of sugar and *gul* per year is 5·4 million tons only. This can provide only 1·3 ounces of sugar and *gul* per head per day as against 2 ounces considered necessary.

Because of the general poverty, people cannot purchase the necessary quantities of oils and sugar ; their limited supply has no effective demand and hence the supply appears to be sufficient. If this is the case with oils and sugars whose supply is considered ample, it is easy to imagine how short the

country is of vegetables and fruit, whose supply is admitted to be very inadequate.

Supply of food-materials and the average consumption

If the annual supply of food-materials is evenly distributed to all people in the country, it will be seen that it is very inadequate. It may be noted that in the present supply are included the imports of cereals and pulses. The imports of food materials other than cereals and pulses, compared with the volume of their total consumption in the country, is negligible and hence we have not attempted to include these in the total supply.

The following table will give an idea of the share of the food-materials that each man or woman will get daily if the supply is evenly distributed to all people.

Daily diet of an average consumption-unit, on the basis of the available food-matetials including the imports of cereals and pulses in 1944, 1945 and 1946 is given below.

	Ounces	Calories (about)
Cereals and pulses	16	1,600
Oils	0·7	176
Milk	5	100
Gul and sugar	1·3	143
Leafy vegetables including wild-vegetables	2	12
Non-leafy-vegetables, including wild-tubers	1	10
Fruit (including wild fruit and berries)	1	13
Spices and condiments	0·5	30
	27·5	2084
Meat, fowl and fish	0·08	3
Eggs	0·03	1
	27·61	2088

This average is very low. It is little more than the basal rate (of 1,700 calories for man and 1,400 for woman) in England and U. S. A. If we take the basal rate for India (where people are light and where climate is hot) at 90 percent of that in England and U.S. A., it comes to 1,530 calories for man and 1,260 for woman and there is very little balance of calories left for ordinary daily activities. A sedentary person in India requires 2,500 and hard working man 3,300 calories.

There is no wonder, therefore, that our men and women are weak, unhealthy and unable to do hard work. There is also no wonder that their mortality is high and the average tenure of life, short.

Out of the available quantities, the rich take an unduly large share and very little is left for the poor; the natural result is frequent famines.

India is now free and she cannot, henceforth, blame others. The Government must handle the serious situation boldly and every son and daughter of the country must try to produce more food and other necessary consumers' goods to make the coming generation healthy and capable of hard work.

CHAPTER VII

THE PROBABLE AMOUNTS OF DIFFERENT FOOD-MATERIALS OBTAINED BY AND THE DIETARY CONDITIONS OF THE DIFFERENT ECONOMIC GROUPS IN THE SOCIETY

With the information about the supply of food-materials, it would be very instructive to find how the different strata of the population in India are fed; what kinds of food-materials and how much of each they eat daily, and whether that quantity provides the energy required by their bodies and for the work they do. To find such information it would be necessary to roughly divide the population into different economic groups, on the basis of the kinds and quantities of food-materials they consume.

Difficulties in dividing the society into economic groups

It is the economic ability of each group of the society that determines the kinds and the quantities of food-materials consumed by it. The supply of each kind of food-material, available in the country or a tract will, no doubt, modify the quantities of food-materials.

Such information is unfortunately not available and we have to make a guess. If some social workers or economists make intensive studies on the spot, and if their findings prove that our guess is far wide of the actual conditions we will not be sorry, as such information will provide more reliable information for the future workers and for the Government of the country. Family budgets in the cities alone are not enough for the purpose.

In making an attempt at such economic grouping there are many handicaps. The first is the want of statistical data; the second is the lack of the basis for dividing the population into fairly well-defined groups and the third is the difficulty of ascertaining even approximately quantities of food-materials such as fruit, vegetables, milk, meat etc. that enter into the ration of different groups. Only the upper-class in the cities can procure fruit, vegetables and meat regularly. In the villages even the upper-class cannot get these regularly. The lower-middle-class of meat-eaters in the cities probably purchases meat once a week. The daily apportionment of such food-materials is very small. It should, therefore, be remembered that the quantities of such shown in the daily-diet of the economic groups, which appear in subsequent pages, is 1/365th part of the food-materials consumed in one year by one adult person.

Economic groups of the society and the probable amounts of different food-materials in their ration

In our attempt to divide the whole population of the country, we have made five groups, (1) the upper and the upper-middle-class (2) the middle-class (3) the lower-middle-class, (4) the poor class and (5) the very poor class.

(1) **The upper and the upper-middle classes.**—This group may consist of *Inamdars*, holders of large estates, *sahukârs*, substantial pensioners, merchants, pleaders, medical practitioners, and salary-earners who make more than Rs. 200 per month and others who command sufficient food-materials either by producing or by purchasing.

This group may be consuming about 24 ounces or more of cereals and pulses, probably about 16 ounces of milk, 4 ounces of leafy vegetables and 4 ounces of non-leafy vegetables (in the cities but much less in villages). Vegetables are generally grown in the vicinity of cities and therefore these have not entered the daily-diet even of the well-to-do villagers.

We roughly attempt a diet that the first group may be consuming. The non-vegetarian rich get meat, fish and eggs too.

Kind of food-material	Ounces	Calories (about)
Cereals and pulses	24	2,400
Oils	2	510
Milk	16	320
Gul	2	216
Sugar	2	226
Leafy vegetables	4	24
Non-leafy vegetables	4	40
Fruit	4	52
Spices and condiments	1	60
	59	3,848
Meat, fowl and fish	4	160
Eggs	1·45	72
	64·45	4,080

This class does not generally do any hard manual work and in fact there must be considerable wastage of food. We think that this class contains about 15 percent of the population.

(2) **The middle-class.**—Consists of persons whose income is between Rs. 80 and 200 p. m. in the cities, the cultivating owners of economic-holdings, small *inamdars* and skilled-labour in the villages, officials of lower rank, army personnel and small merchants. The diet of this class may be as under.

	Ounces	Calories (about)
Cereals and pulses	21	2,100
Oils	2	510
Milk	10	200
Gul	2	216
Sugar	1·5	170
Leafy vegetables	3	18
Non-leafy vegetables	2	20
Fruit	2	26
Spices and condiments	0·5	30
	44	3,290
Meat, fowl and fish	2	80
Eggs	0·72	36
	46·72	3,406

This class has both sedentary workers and hard workers. There is probably no waste of food and the food they get must be making up the energy required. This group may consist of about 20 percent of the population.

(3) **The lower-middle class.**—Their monthly income is between Rs. 40 and 80 per month in the cities and Rs. 35 and 60 in the mofussil. This group may consist of small cultivating-holders, the Police and Priests, clerks and talathis, and masons and carpenters in villages. This group may be getting the following quantities of food materials in their daily diet :—

	Ounces	Calories (about)
Cereals and pulses	16	1,600
Oils	1·5	382
Milk	4	80
Gul	1·5	162
Sugar	1	113
Leafy vegetables	2	12
Non-leafy vegetables	1	10
Fruit	1	13
Spices and condiments	0·5	30
	28·5	2,402
Meat, fowl and fish	1	40
	29·5	2,442

This is a class of workers. The members of this class do not get sufficient quantity of food nor the calorie-value from the food, they are assumed to get. They, indeed, need 4 ounces more food-grains, if not more of the other food-materials. This group may form of about 30 percent of the population.

(4) **The poor class.**—People whose income in the cities is less than Rs. 30 to 40 p.m., agricultural tenants and agricultural labour in villages and domestic servants working on cash payment in cities may be included in this group. Certain classes of vagrants who are physically fit but who do not like to work; and though parasites on the society, manage to get as much food or perhaps more than other members of this group can be put in this class.

This group may be getting the following quantities of food-materials in their daily diet :—

	Ounces	Calories
Cereals and pulses	12	1,200
Oils	0·5	127
Milk (in the form of butter-milk)	1	20
Gul	1	108
Sugar	0·5	56
Green vegetables (mostly wild vegetables in the season)	4	24
Non-leafy vegetables (including wild roots)	3	30
Fruits and berries (mostly wild) in the season	1	13
Spices and condiments	0·5	30
	23·5	1,608
Meat and fish	0·5	20
	24	1,628

This group contains a large number of workers. They are half-starved and cannot put-in adequate amount of work for want of the required energy. In certain seasons they get even less food than shown in the table. As workers, in the harvest season they eat more sugarcane and ground-nuts and in rainy season wild-vegetables and in summer wild-fruits, berries and raw mangoes and similar fruits to fill their bellies. Their ration needs considerable increase by way of cereals if their labour is to be gainfully utilised. Professional begging must be stopped and the physically fit beggars must be made to work and produce their share of food.

This class may contain about 25 percent of the population.

(5) **Very poor-class.**—This group consists of people who are invalid or maimed and who have nobody to support them and of beggars and destitutes who cannot work and who have to live on charity or on begging. They may be collecting wild vegetable, wild fruits and berries getting some sugarcane and groundnut at harvest time by begging.

It is not necessary to assume any diet for this class. Still they must be drawing on the common pool to a considerable

extent. To live somehow, they must get at least 3 ounces of food-grains, some oil, *gul* and butter milk.

We think that this group contains about 10 percent of the population.

Dietary conditions of the different economic groups in the society

The population of the country, at an average ration of 16 ounces per consumption-unit per day, requires 56·2 million tons food-grains every year. Also on the assumed basis of ration for the different economic-groups referred to above, the total food-grain requirements of the country come to about the same (or 56·2 million tons); since we have divided the available grain stock (produced and imported) as is supposed to be consumed by the different groups.

The diet of the first group is certainly satisfactory and that of the second group is not bad. The third and the fourth groups form the majority of the producers of economic-goods and renderers of service to the society and their standard-of-living must be raised. The fifth group is practically unproductive to-day and is a burden on the society. The experience of other countries shows that even this class can be made self-supporting.

The first two groups, about 35 percent of the population, can afford to get sufficient milk, vegetables and fruit, in addition to cereals and pulses. The third group (or 30 percent of the population) may be getting small quantities of milk and vegetables; while the fourth and fifth, comprising between them 35 percent of the population, do not get any milk, garden vegetables or fruit. As we have said above, they gather wild vegetables and roots and fruit in certain seasons.

Restricting the remarks only to food-grain ration, which is the most important item of the Indian diet it can be said that the last three groups making 65 percent of the population do not get sufficient food-grains.

CHAPTER VIII

FOOD REQUIREMENTS OF 1947 AND 1971 AT 24 OUNCES FOOD-GRAIN RATION

During recent years, the population of India is increasing by 10 percent every decade. It was 389 millions in 1941. At this rate of increase it is expected to be 429·9, 470·6 and 517·7 millions in 1951, 1961 and 1971 respectively. It may be 412·2 millions in 1947. In the earlier pages we have shown that 100 population make 84 consumption-units, for food-requirements. The consumption-units in 1947 and 1971 will, therefore, be 345 and 434·8 millions respectively.

Deficit of food-grains at 16-ounces ration in 1947

India produces about 53·9 million tons of cereals and pulses; while the consumption, at present, is 56·2 million tons, the gap of 2·3 million tons being made good by imports. We have shown that the present supply (53·9 million tons produced and 2·3 million tons imported) is inadequate, the average food-grain-ration, being only 16 ounces per day per consumption-unit.

Requirement and deficit in 1947 at 24 ounces ration

With the shortage of other food-materials (as milk, meat, eggs, fruit, vegetables and even oils) the average food-grain-ration should be 24 ounces, instead of 16 ounces. If every person, therefore, were to get full meals (or 24 ounces per consumption-unit per-day) the country would require 84·3 million tons of cereals and pulses. In fact, the gross requirements will be about ten percent more for making allowance for seed and wastage due to storage and vermins. Thus the gross requirements of the country in 1947 would work to about 92·2 million tons, while it produces only 53·9 million tons. The actual present shortage is, therefore, 92·2 minus 53·9 or 38·3 million tons and not 2·3 million tons. This shortage can-

not be met in the near future by producing more. The question of stepping up production, however, will have to be grappled with immediately. The country can no longer avoid the issue. In the old days when people could not get more food they took it complacently. They were half-starved and often died in large numbers when there were food-famines. The situation is totally different to-day and the people will hold the Government responsible for any future famines or shortage of food.

Requirements at 24 ounces ration in 1971

Let us see what the country's food requirements in 1971 would be. We have taken the year 1971 because any long-term-plan of stepping-up food-production takes 20 to 30 years to materialise. Short-term plans like the "Grow more food campaign", tried in recent years, have proved ineffective and more costly. The population, as shown above, will be 517·7 millions in 1971. This makes 434·8 million consumption-units. At 24 ounces (i. e. the food–grain–ration, considered essential) the country would require 106·3 million tons for food and 16·9 million tons extra to allow for seed requirements and unavoidable wastage or in all 123·2 million tons. It means the present production of food-grains (53·9 million tons a year) will have to be more than doubled before 1971.

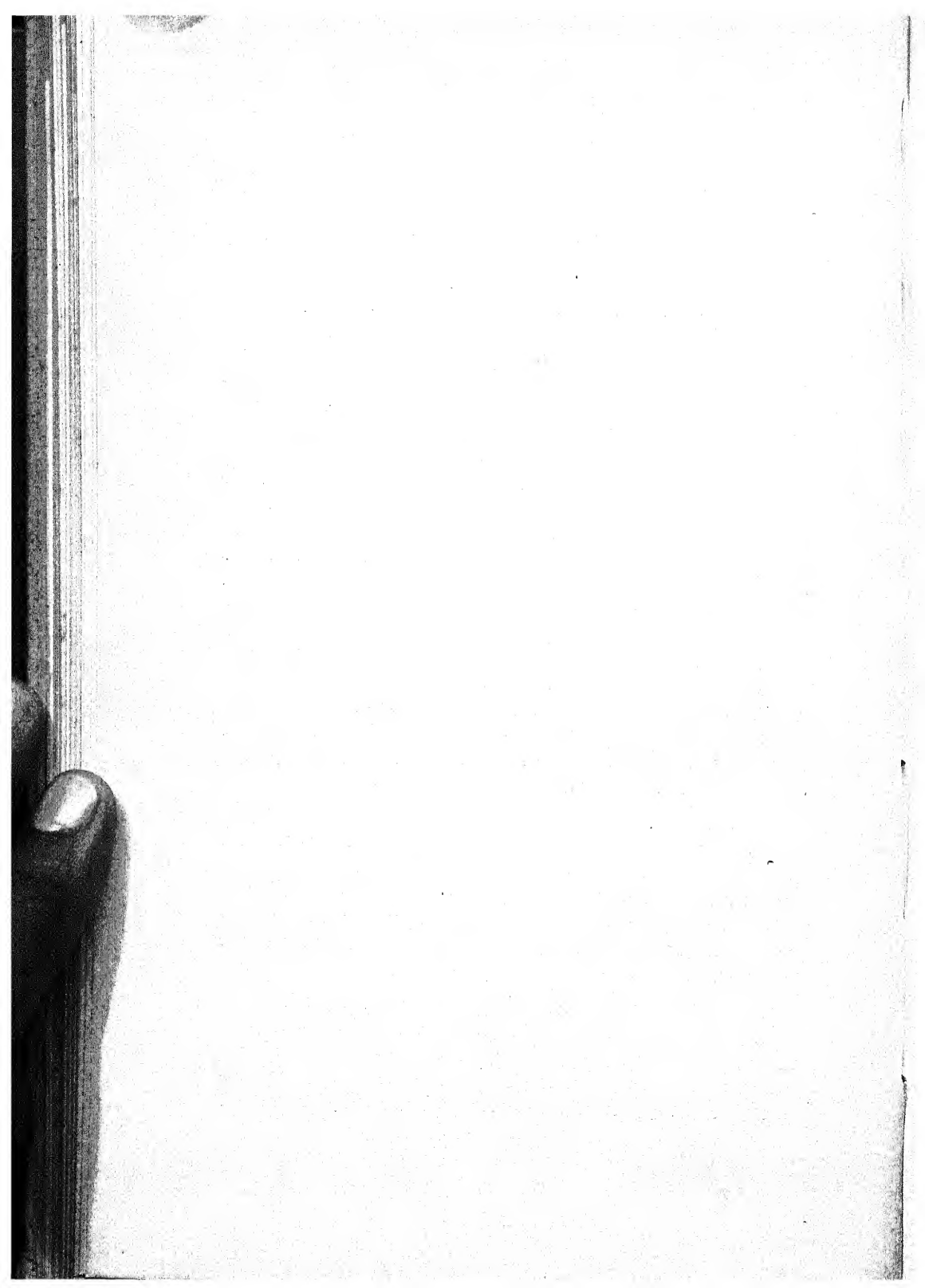
CHAPTER IX

IT IS POSSIBLE TO MAKE INDIA SELF-SUPPORTING AS REGARDS FOOD-GRAINS

In these days of scientific progress, it is possible to double the food-grain production. Not that there is much good cultivable-land, that can be opened and sown immediately, but there is a considerable amount of land in rain-scarcity areas which is submarginal, under the present conditions, which can be brought under cultivation. Large areas of such lands are quite good, but cannot be cultivated because there is no irrigation nor is there sufficient rain water. If water is brought to these lands they can be immediately put under crops. These are practically virgin lands and will yield heavy out-turns. Others, in the semi-arid tracts can be improved by terracing and bunding. With water and manure they can produce good crops. Provision of canal irrigation to arid and semi-arid tracts of the country can solve the food-problem. If canals on large scale are opened, the tracts which grow fairly good rain-fed crops will, with the supplement of canal water, almost double the out-turn of *kharif* crops and can in suitable places, grow second or *rabi* crops.

Thus the lands at present under crops and those that may come under crops, after the country is well served with more canals, will it is hoped, produce sufficient grain. Indian soil is deficient in Nitrogen and Phosphoric acid; application of fertilizers will improve yields considerably. For a country of the size of India a number of large fertilizer-plants are necessary.

Irrigation schemes and fertilizer plants are the problems for the Irrigation and Industries Departments and we learn that the Minister in charge of Works, Mines and Power has already taken up the question in hand. All the same, we have made some general suggestions for increasing food supply, in part III.



PART II

FOOD PROBLEM IN KOLHAPUR STATE

CHAPTER X

THE PROBLEM, ITS GENESIS AND SCOPE

Kolhapur problems are mixed with those of the Western India

Being a small part of the Bombay Province and surrounded by its districts, Kolhapur State has to trade with and exchange its products in the neighbouring districts. The food-problem of Kolhapur is naturally mixed up with the food-problem of the surrounding districts, whose economic problems are interdependent on those of the whole India. As a matter of fact all problems of economic, social and educational importance of the State are closely linked with those of the Bombay Province and of India.

In part I on the food-problem of India, we have tried to give general information as regards production, consumption and deficit of food, especially of the major food-grains in the country.

We propose to do the same for Kolhapur State in detail, in chapters X to XIII. We hope, such investigation will serve as a detailed regional survey of food-situation for a part of India.

Of the deficit provinces of India, Bombay is one. Satara, Ratnagiri, Bijapur and Sholapur districts and the northern part of Belgaum district are noted for their shortage of food-grains. Kolhapur, lying in the midst of these districts and having more population per square-mile than any of these districts, has to import food-grains every year.

It is true that the rainfall in the main part of the State is more favourable and the cultivator is more industrious than in the neighbouring districts. This advantage is, however, neutralised by the larger population for the cultivable area of the State. Though the State has an excellent river-system which enables the industrious farmer to grow sugarcane on a large scale on lift-irrigation, the lie of the land is unsuitable for

canal-irrigation and even for well-digging. He, therefore, cannot do better under the existing conditions.

Food-problem precipitated by the war conditions

Since World War II, the shortage of food-grains is more keenly felt in the State. The State is normally a deficit area as regards cereals and pulses. Moreover, there was and there still is the dislocation in transport system, and hence the shortage is felt all the more. The average annual import of food-grains, during the last three years (1944, 1945 and 1946) amounted to 22,645 tons, entailing an annual expenditure of Rs. 77,71,813 (Appendix C_1). This amount is the landing price at the Kolhapur Railway station and does not include the cost of internal transport to the godowns and from the godowns to the consumers; nor does it include the over-head charges of the Food-supply Department of the State. It may further be noted that the imports have not covered the real deficit in-as-much-as the requirements of the population could not be fully met with by the local production and the imports.

In the earlier pages we have deplored the fact that four percent of India's population requires to be fed on imported food-grains. Let us see how does Kolhapur State compare with India in this respect. The population of the State, according to the Food Rationing Department, in 1944-45 was 12,10,000. The local annual production of food-grains, as will be seen later, is 1,20,532 tons, while the imported quantity comes to 22,645 tons. **It means sixteen persons out of every hundred are fed on imported food.** The food-grain situation in the State can, therefore, be said to be worse as compared with that of the whole country.

Till the out-break of the War, very few people had realised that Kolhapur was so short of food-grains. Many thought that the State was producing sufficient quantities of cereals and pulses for the requirements of its population. The facts, however, are otherwise. If we refer to the Report of Major Graham, the Political Superintendent of Kolhapur, we can well see that the State was never self-sufficient. Even in 1853 there was import of 30,000 *maunds* or about

2,143 tons of food-grains.* This Report was written under the orders of the East India Company, who had just taken the superintendence of the State. After Major Graham's report no authoritative attempt was made to gauge the food situation, nor were the exports and imports carefully recorded.

Scope of the work and the sources of information

Our work is an attempt to survey the food-situation of the State and to find out the extent of the gap between the consumption and the production. We have made use of all the available material, the main sources being Major Graham's Report, Kolhapur Gazetteer and the Administration Reports of the State from 1881 to 1945. In addition, we made special investigations from 1942 to 1947 to supplement the available information. During the last World War and afterwards due to the dislocation of transport, most provinces including Kolhapur State, felt the shortage of food. Government of India had to import food-grains from outside and control the imports and internal produce with a view to introducing rationing. Kolhapur Government had to follow suit. The Supply Department of the State had to maintain careful record of imports and exports of food-grains and other commodities. We have made use of this record to check our findings regarding the deficit of food-grains in the State.

We have attempted to find the production of food-grains in the State with the help of agricultural statistics found in the old and the current records. Nevertheless, we like to make it clear that such statistics are generally liable to be inaccurate and we, therefore, are bound by their limitations. Village agricultural statistics are generally handled by untrained village officers and collated at the taluka places by clerks, having no experience in statistical methods. As a result, inaccuracies creep in. Collection of statistics, pertaining to agriculture, is of vital importance and leaves much to be desired. Our conclusions, based on such statistics, should be accepted as estimates rather than accurate quantitative results.

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* Major Graham's Report pp. 12 and 269.

CHAPTER XI

REVIEW OF THE CO-RELATION BETWEEN THE POPULATION AND THE AREA UNDER CULTIVATION, FROM 1852 TO 1945

Selection of different periods

The present food-situation will be more intelligible if read against the background of past situation. We, therefore, attempt a survey of the past, selecting particular years representing different administrations in the State.

The start is made with the year 1852–53, for which information is available in Major Graham's Report. As mentioned above, Kolhapur State had just come under the superintendence of the British Government when Major Graham produced his valuable Report. For the second stage we have taken the year 1881–82, information regarding which is available in Campbell's Imperial Gazetteer, Kolhapur. After these individual years, we have considered years in groups, with a view to even out the effects of good and bad years. The first group covers the period from the year 1893–94 to the year 1897–98. This period marks the beginning of His Highness Shahu Chhatrapati's reign and the end of the direct British Superintendence. The second group extends from the year 1915–16 to 1919–20. These years are the last years of Shahu Maharaja's rule. The period from the year 1935–36 to 1939–40 is the last phase of H. H. Rajaram Maharaja's reign. The last group extends over the period from 1940–41 to 1944–45, when there was administration by the Council of Regency with Her Highness the Chhatrapati Maharani Tarabaisaheb as the President.

We have taken the population and the net-cropped area in these periods and found out the net-cropped area per capita in the State. The net-cropped area includes all kinds of crops, food and non-food. It may be noted that the area under *kumari* and rice in the forest area is not included in the village

and district revenue statistics. In finding out the quantity of food-materials per head in the final stages, we have taken note of the produce of such lands.

Population in relation to net-cropped area in different periods from 1852 to 1945

The following table gives the population and the net-cropped area in the State, with their indices at different periods and also the net-cropped area per head of population.

TABLE* I

Serial No.	Period	Population		Net-cropped area		Net-cropped area per head Acres
	Year	Actual	Index No.	Acres	Index No.	
1	1852–53	5,46,156	68·25	3,40,000	45·50	0·62
2	1881–82	8,00,189	100·00	7,47,093	100·00	0·93
3	1893–94 to 1897–98	9,10,011	113·72	10,12,305	135·50	1·11
4	1915–16 to 1919–20	8,33,726	104·19	10,29,587	137·01	1·23
5	1935–36 to 1939 40	10,38,077	129·70	10,26,736	137·43	0·99
6	1940–41 to 1944–45	12,10,000	151·20	10,23,132	136·94	0·84

* Basis for (1) Index, (2) Population and (3) Area:—(1) **Index numbers.**—The population and area of 1881–82 are taken as 100 each, for working out the index-numbers of the periods. The reason, for selecting 1881–82 as the base year, is that before then, the population and the areas were not carefully computed. Moreover, before 1881–82 village records were not maintained according to the present system. (2) **Population.**—The population of the State in the year 1852–53, according to Major Graham, was 5,46,156 and that for the year 1881–82, according to Kolhapur Gazetteer, was 8,00,189. The population in 1891 and 1901 was 9,13,131 and 9,10,011 respectively. There being very little difference in the decade, we have accepted the population of 1901 to repre-

(*Continued on next page*)

It may be remembered that in the State about 80 p. c. of the cultivated land is under food-crops. Hence the co-relation of population with the net-cropped area is very important, in-as-much-as the food produced determines not only the well-being but also the health and the very existence of the people.

Conditions in most of the other parts of the country are not very different and a critical examination of the relation between the cropped-area and population of Kolhapur, will be indicative of the conditions in most parts of India.

First period (1852-53).—The British took over the administration of the State under their direct control in 1844, and the year (1852-53) comes soon after the assumption of the direct control by the Government.

(*Continued from last page*)

sent the population for the third group (1893-94 to 1897-98). For the fourth group (1915-16 to 1919-20) we have taken population of 1921, which was 8,33,726. From 1931 to 1941 the population increased by 1,34,909. For the sake of convenience we have taken the increase in population as being uniform throughout the ten years, and have selected 1937, the mid-year of this group, to represent its population. Taking annual increase at 13,490 from 1931 to 1937, the population comes to 10,38,077 which we have taken for the fifth group, (1935-36 to 1939-40). For the last group, namely 1940-41 to 1944-45, we have taken the population arrived at by the Food-rationing Deparrment, Kolhapur, who had taken special census for rationing purposes. (3) **Area.**—The area for the year 1852-53 given by Major Graham, is in *bighas*. The area is given as 4,80,566 and 4,80,684 and 5,06,761 and 4,40,367 *bighas* on pages 6, 7, 8, 10 and 74. The *bigha* is not a definite measure. On page 6 of his report, Major Graham gives it as equivalent to 3,800 sq. yards; while on page 31 he gives it as 40,000 sq. ft. or 4,444 sq. yards. Since in those days the units of measurement were span (*moot*) and stick (*kathi*), different surveyors have given different yardage for the acre. Considering these variations carefully, we have taken the old *bigha* as equivalent to 0·85 acre. With this consideration we have taken the area for the year 1852-53 as 4,40,000 *bighas* or 3,40,000 acres. Area for the year 1881-82 is taken from the Kolhapur Gazetteer, pages 156 and 157. For the other period we have taken the averages of the years that constitute the group. The areas for these periods are taken from Administration Reports of the State.

From the above table it will be seen that in 1852–53, the area under crops and the population were not large. Though there was plenty of good land available, for several reasons, land, sufficient even for the small population, was not opened till the Government assumed direct superintendence of the State. It may be asked why more land was not opened before. The main reason is the unsettled conditions in this part of the country, especially in the State, prior to the Government's taking over the administration. Due to the internal quarrels with the *Jahagirdars* and the *Peshawas*, there was not sufficient security to the cultivators and they had no incentive to increase cultivation and production. Before the British took over the administration of Kolhapur, there was comparative peace in the surrounding British districts and it seems that the deficit in food-grains in the State was made good by the imports from those districts.

Second period (1881–82).—After the British took over the administration of the State in 1844, peace was established and farmers got a sense of security. This led to the increase in cultivation. Land under cultivation was more than doubled from 1852–53 to 1881–82. With the increase in cultivation and the consequent increase of food-supply, population, between 1852–53 and 1881–82 increased by 47 per cent. It seems, by 1881–82 food-production was sufficient for the population in normal years.

Third period (1893–94 to 1897–98).—From the second period (1881–82) to the third, cultivation increased by 35·5 per cent, while population by 13·7 per cent. These increases are not as large as those from 1852–53 to 1881–82; still by about 1893–94, most of the good land seems to have been opened for cultivation.

Fourth period (1915–16 to 1919–20).—From the third to the fourth period the index-number of population fell from 113·7 to 104·2, while that of the area under cultivation rose by 1·5; consequently the cropped-area, per-head of population, increased from 1·11 to 1·23 acres.

Fifth period (1935–36 to 1939–40).—From the fourth to the fifth period, population increased considerably, while

the cultivated area did not change to any extent. As a result the net-cropped area per-head dropped from 1·23 acres to 0·99 acre.

Sixth period (1940–41 to 1944–45).—Here again, from the fifth to the sixth period population increased considerably, while area under cultivation dropped a little; consequently there was further decrease in the area per-head, from 0·99 acre to 0·84 acre.

All the six periods from 1852 to 1944–45.—From 1852–53 to 1944–45 the population was increasing fast with the exception of one interval, between the third and the fourth periods; while there was practically no increase in cultivation from the third group till 1945. This position is not sound.

The natural effects of the growing population are obvious, the most alarming being the acute shortage of food-grains. The State had to import in 1944, 1945 and 1946 on an average about 22,645 tons of food-grains. Of the imported quantities the Indian-corn (maize) and the milo, from the United States of America were generally old and poor, but most people had to eat these because they had no other alternative. It may be noted that Indian-corn and milo are used in America as cattle-feed; only certain varieties of Indian-corn are used as subsidiary human food.

The enormous increase in population has reduced the cultivated area per head from 1·11 acres to 0·84 acre from 1893–94 to 1944–45 and reduced the size of the already small holdings. Uneconomic holdings do not afford scope for the intelligent farmer nor full employment to the farm-labour and farm-stock. The number of milch-cattle could not be increased. Some of the grass area had to be opened for growing crops and the amount of milk available per head of human population has fallen to 2·9 ounces per day.

CHAPTER XII

PRODUCTION OF FOOD-GRAINS (CEREALS AND PULSES) FROM THE KIRDSAR OR ASSESSED LAND, IN RELATION TO THE POPULATION OF THE STATE FROM 1852-53 TO 1944-45.

In Chapters XI and XII, we had to restrict our consideration to assessed lands only, because the Central and Provincial Governments take no note of food production from unassessed lands.

Having dealt with the population and the area under crops in the State, at different periods, we propose to consider the food-grain production in relation to population for the same periods. Cereals and pulses form the main bulk of food and the principal source of energy (in terms of calories) for the people. We, therefore, propose to consider the production and consumption only of cereals and pulses.

Regarding the produce from cereals and pulses, at different periods under consideration, the quantities are arrived at on the basis of the average out-turns per acre. In the case of rice the quantities of paddy-produce are turned into clean rice. The net quantities available are worked out, after making allowance for seed and wastage.

Since food requirements of adults and children vary, we have turned the population of different periods into consumption-units (as explained on page 18).

Annual production and daily supply of food-grains per consumption-unit, during the different periods

The following table gives the population (turned into consumption-units), the annual supply of cereals and pulses available for food purposes and the quantities of these per consumption-unit, per day in the State. The table is compiled from the material given in appendices E 1 to E 6.

TABLE 2

Serial No.	Period	Population in terms of consumption-units		Local annual supply of cereals and pulses available for consumption		Local supply of cereals and pulses per consumption-unit per day ozs.
		Consumption-units	Index No.	Lbs.	Index No.	
1	1852–53	4,58,771	68·25	28,46,37,156	124·93	22·20
2	1881–82	6,72,159	100·00	22,78,29,841	100·00	14·86
3	1893–94 to 1897–98	7,64,409	113·72	33,91,27,635	148·85	19·45
4	1915–16 to 1919–20	7,00,330	104·19	34,57,46,113	151·76	21·64
5	1935–36 to 1939–40	8,71,985	129·73	30,78,96,408	135·14	15·48
6	1940–41 to 1944–45	10,16,400	151·21	26,99,92,571	118·50	11·64

The quantity of food-grains available in 1852–53 is taken from the Report of Major Graham (Appendix E 1). We think that the per-acre yields, assumed by him, are far too high. In appendix A (the basis of the production of food-grain) we have given our comments on production per-acre. The term "Local supply" in this table means the food-grains produced in the State only. It does not include any imported grain nor does it include the other food-materials, produced in the State. The quantity of grain produced in the cultivated area in the forest is also not included in the figures given in the table.

(1) **Interval between 1852–53 and 1881–82.**—The figures of local supply in 1852–53 seem larger to us. We have doubted the per-acre out-turns of Major Graham. Further, it may be noted that the area under crops in 1852–53 was less than half of that of 1881–82. We, therefore, are not prepared to believe that the total production fell from 1852–53 to 1881–82. We think that there was not as much produce in 1852–53 as is assumed by Major Graham.

(2) **Interval between 1881 and 1893-94 to 1897-98.**- In this period the index number of population rose from 100 to 114 while that of the supply rose from 100 to 149; consequently the supply of food-grains, per consumption-unit per day, rose from 14·86 to 19·45 ounces,

(3) **Interval between 1893-94 to 1897-98 and 1915-16 to 1919-20.**—During this interval, from the third period to the fourth, the population decreased and consequently the index-number of consumption-units dropped from 114 to 104; while the index-number of supply rose roughly from 149 to 152. As a result, the supply of grain further rose from 19·45 to 21·64 ounces per consumption-unit per day.

(4) **Interval between 1915-16 to 1919-20 and 1935-36 to 1939-40.**—From the fourth to the fifth period, the index-number of consumption-units rose from 104 to about 130 and that of the supply dropped from 152 to 135; naturally the quantity available per consumption-unit per day suddenly dropped from 21·64 to 15·43 ounces.

(5) **Interval between 1935-36 to 1939-40 and 1940-41 to 1944-45.**—During this last interval, the index-number of consumption-units, jumped from 130 to 151, while the index-number of supply fell from 135 to 118; as a result the supply of grain, per consumption-unit per day dropped considerably, from 15·48 to 11·64 ounces.

(6) **The whole period from 1852-53 to 1944-45.**—The table, on the whole, shows a regular increase in population, except from the third to the fourth period. The figures of supply show a drop from 1852-53 to 1881-82. There was probably no actual drop. To our mind the supply, assumed by Major Graham, for the year 1852-53, is too much. The reason of the sudden increase of supply from the second to the third period is the opening of new lands and consequent increase in the cropped-area. From the third period to the last (or roughly from 1893 to 1945), there is very little change in the area under cultivation (vide Table 1). The supply, therefore, should not have changed during this interval, had the proportion of the area under food-grains to the total area under cultivation, remained the same. From 1915, part of the area

under food-grains has gone under groundnut and sugarcane. Further, after 1939, when the price of *gul* rose, more area went under sugarcane, at the expense of food-grain area and naturally the supply of food-grains per consumption-unit fell very considerably.

The above lines, we expect, will explain the reasons of the acute shortage of food-grains and of the necessity of larger imports in recent years.

CHAPTER XIII

THE TOTAL ANNUAL SUPPLY OF FOOD-MATERIALS FROM ALL SOURCES INCLUDING THE IMPORTS, THE DAILY RATION PER CONSUMPTION-UNIT AND THE CALORIE VALUE OF THE RATION

In Chapter XII, we have considered the supply of cereals and pulses from the assessed lands only. Reason for restricting ourselves to assessed lands is to enable us to compare the food-supply of the State with that of India, whose statistics do not include the food-produce from forest areas.

It should, therefore, be noted that the annual supply (i. e. 26,99,92,571 lbs.) given in table 2, does not include (a) the supply of grains from the unassessed area and (b) the imports from out-side.

Supply of food-grains from the cultivated area in the forest and the imports

The food-grain supply, from the forest area in the State, comes to about 1,693 tons a year or 0·16 oz. per consumption-unit per day. The average annual imports come to 22,645 tons or 2·19 ozs. per consumption-unit per day (Appendix C_1). To get an idea of the present total grain-supply, we have to add these two to the main supply from the assessed lands, given in table 2, for the group 1940–41 to 1944–45. The position then will be as under.

TABLE 3

Serial No.	Sources of food-grains	Annual supply		Daily ration per consumption-unit Ozs.	Calorie value of the ration
		Lbs. or Tons			
1	Assessed land	26,99,92,571	1,20,532·4	11·64	1,164
2	Cultivated area in the forest	37,92,255	1,692·9	0·16	16
3	Imports	5,07,24,731	22,644·9	2·19	219
	Total	32,45,09,557	1,44,870·2	13·99	1,399

The total food-grain ration per consumption-unit per day of about 14 ozs. provides roughly 1400 calories. We have not yet added to the ration, other subsidiary food-materials. Since they form a small part of the ration, it can be said that the grain-ration is very inadequate.

Food-materials other than cereals and pulses

In addition to cereals and pulses certain other food-materials, such as sugar, *gul*, oils, milk, vegetables and meat etc. enter into food-ration. Their supply is small. We have commented on their paucity in Chapters VI and VII. Still, taken to-gether these add about 11 ozs. of food-materials to the daily ration and provide 630 calories. Appendix D gives the kinds and quantities of such food-materials.

The total aggregate-ration

When the subsidiary food-materials, described in the above para (detailed in appendix D) and the calories obtained there-from are added to the grain-ration, the aggregate daily ration and the energy supplied by it will be as under.

TABLE 4

Name of food materials	Quantity available per consumption-unit per day ozs.		Calories available per consumption-unit per day	
(1) Total food-grain as per table 3	14·00		1,400	
		14		1,400
(2) *Gul*	1·00		109	
(3) Sugar	0.46		51	
(4) Oils (cooking)	1.10		280	
(5) Milk and milk-products	2.90		58	
(6) Meat	0.07		4	
(7) Eggs	0·01		1	
(8) Fish	0·04		1	
(9) Condiments and spices	0·50		30	
(10) Vegetables	2·76		17	
(11) Fruits	1·80		23	
(12) Groundnut (kernels)	0·35		56	
	10·99			
		10·99		630
		24·99		2,030

From the table above, it can be seen that the quantity of food-grains (as per item 1) available per consumption-unit is 14 ozs., supplying 1400 calories; the other food-materials (as per items 2 to 12) yield about 630 calories, making total of 2,030 calories.

The number of calories obtained from all possible food-materials falls much below the requirements of even a sedentary worker, who requires about 2,600 calories per day; whereas a fairly hard-worker requires about 3,300 calories per day.

Plea for increasing the production of food-grains (i. e. cereals and pulses)

The State, therefore, for the health of the people and to get more work from the labour-force, will have to increase the supply of food-grains and other food-materials. In our country, where the standard of living is very low, the supplies of food-materials, other than grains such as milk, vegetables, sugar, meat, eggs etc., cannot possibly be increased materially under the present conditions. The practicable solution, to our mind during the near future, is to make plans for increasing the supply of cereals and pulses.

The real deficit of food-grains at present (1947) and in 1971

To make such plans we must know our present (i.e. 1947) real deficit and the probable grain-requirements in 1971 at 24 ounces of grain-ration. Grain-ration at 24 ounces (or 2,400 calories) with 630 calories in the form of other food-materials (Table 4 items 2 to 12) will supply 3,030 calories which should satisfy the energy requirements of workers, who form the main bulk of our population. When the target of 24 ounces of grain-ration, for the population of 1971, is reached, the next generation can think of modifying our food-production policy by increasing other food supplies such as milk, vegetables, fruits etc. Meantime, without special efforts on the part of Government, the farmer by himself, will steadily grow more vegetables and fruit or produce more milk in suitable localities, if he finds that these pay better than cereals.

In the State, the population, from 1921 to 1931 as also from 1931 to 1941, increased at 14 per cent per decade. If something unforeseen does not happen and if food-supply is guaranteed, the population may increase at 14 per cent per decade. At that rate of increase, the population may be 11,83,778 and 12,44,932 and 14,19,222 and 16,17,913 in 1947, 1951, 1961 and 1971 respectively.

At 24 ounces of grain-ration the requirements of 1947, would be 2,44,018 tons, whereas the State produces (in the assessed lands) only 1,20,532 tons. The present real deficit is, therefore, 1,23,486 tons a year.

In 1971, we expect that there will be 13,59,047 consumption-units in the State. At 24 ounces grain-ration, the State will require 3,32,178 tons of food-grains by 1971. That means the supply of food grains will have to be increased from 1,20,532 to 3,32,178 tons or by about 275 per cent.

This is a Herculean task and nobody in old days would have thought it possible to achieve it. In the present days of science, however, it is not impossible. The Government of India has seriously taken in hand schemes to produce food requirements of 30 years hence and if the Kolhapur State or for the matter of that every province and every big State, takes the question seriously, the hands of the Central Government will be strengthened and its task made comparatively less difficult.

PART III

GENERAL SUGGESTIONS FOR INCREASING FOOD SUPPLY

CHAPTER XIV

GENERAL SUGGESTIONS FOR INCREASING FOOD SUPPLY FOR THE POPULATION, POLICY AND WAYS AND MEANS

General remarks

Before making suggestions for increasing food-supply of India, it may not be out of place to give the current views on population and food-supply. It is said that "man's history on earth has always been race between his population and his food supply and that the race is likely to end in tragic population-crisis." According to Sir John Boyd, head of the United Nations' Food Committee, "two third of the population of the world are under-nourished all the time."

For many years the United States was helping to feed China. Yet even before the war, the American Red Cross had given up famine relief in China on the grounds "that the result was always an immediate increase in population, which meant increased misery in the form of more hunger and starvation for even more people than before."

Irrigation projects, prevention of erosion and of the washing of lands, supply of fertilizers and improvement of crops by breeding no doubt offer prospects of increasing food supply. Taking for granted that these measures increase food supply for the present population, what about the ever increasing population? The experience is that "in the race between food and population, population overtakes the food."

The only possible ultimate solution, according to experts, is population-control.

The war-minded nations think that man power is essential for protecting their nations. C. Lester Walker does not agree with this view. He thinks that "in terms of military strength the over-populated nation is weakened by its extra people, since modern army is fed and equipped by the surplus of food and materials a people can produce."

Since the thickly populated and prosperous country, like the U. S. A., considers it necessary to control its population, how urgent such a necessity for the thickly populated poor India is, need not be stressed.

How to bring birth-rate down, is an important question. Experts suggest (a) industrialization (b) raising the standard of living and (c) education of masses and propaganda regarding the necessity of population control.

It is believed that industrialization not only reduces pressure of population on land, but it increases the growth of cities; while urbanization and higher standard of living create more wants. The greater expense, for the higher standard of living and in the rearing of children, generally brings down birth-rate. This is the experience in the western countries. It is true that the first result of industrialization is to increase population, but in course of time family responsibility teaches the industrialized and urbanized population to accept birth-control. The central and the provincial Agricultural Departments are trying to improve the yields of crops by different methods such as plant breeding, conserving soil and soil-moisture and controlling crop-pests etc. Government have launched schemes to harness rivers to generate power for industries (including fertiliser plants) and to provide more water for irrigation. They are introducing land reforms such as abolition of *Zamindari* and regulation of land rents and other beneficial social legislation, including compulsory education and State insurance. All these should create conditions more favourable for better standard of living.

Unless, however, public opinion is educated, it is feared that these beneficial measures may be defeated by tomorrow's birth-rate. Professor K. T. Shah and Sir V. T. Krishnamachari think that in the interest of social economy, family happiness and national planning, family-planning and limitation of children are very essential,

It, therefore, seems necessary to make plans to establish clinics for free supply of cheap and practicable contraceptives, side by side with compulsory education and special arrangement for social education with suitable literature. Further,

social legislation such as abolition of poligamy, raising of marriage age, preventing further growth of lepers and abolition of begging may be thought of. If such measures are taken in hand immediately, the indiscriminate increase in population can be checked. If population remains fairly steady, there will be no fear of its overtaking the planned increase in the means of livelihood. Under such conditions people will get sufficient food and clothing and life in India will be happy.

Considering the points raised in the above paras it seems that the decision, taken by the Government for steadily removing the food-control and reducing the imports of food-grains, is in the right direction. It is not unlikely that for some time it may cause hardship; but ultimately it will be for the good of the country. India must adjust herself and she must stand on her own legs. An agricultural country cannot depend long, for food and clothing, upon other countries.

Still, for some years till the country produces sufficient food, the Government has to keep careful watch over country's food supply. The laissez-faire policy won't do any longer. It is gratifying to note that the Secretary to the Government of India Food Supply Department has recently announced "agricultural prices stabilization as an accepted policy of Government". He proposes to hold 20,00,000 tons of food-grains to support the minimum and maximum prices to be guaranteed by the Government."

Suggestions on general policy

India has been an agricultural country. The Western civilization of the industrialized countries brought new ways of life in India, without herself being industrialised. For several decades she entirely depended upon foreign countries for the supply of various new commodities, which were introduced in her changed life. These commodities, manufactured on mass-scale by power machinery, were cheap and naturally killed most of the cottage industries in India. It is only in recent decades that some industries have been started in India; but without her own heavy industries she is still dependent upon foreign countries for machinery of every kind.

She, therefore, cannot compete with those countries in production-capacity and hence is unable to stem the influx of foreign goods in India. India, therefore, must do every thing possible to expedite industrialization; a purely agricultural country has no place in the present civilization. Any amount of crop production, without industries, cannot provide the present day needs. This is, however, a big question and we have to leave it to experts.

Agricultural policy

Initial emphasis in industrializing India must, perforce, be on agricultural industries, such as oil, sugar and cotton industries and others like fertilizer-plants for producing manure and projects for producing farm-power. We are of the opinion that the food-problem of the country must be considered as a national problem and that it cannot be solved on the provincial or states basis. This, however, does not mean that, in the vast country, one extreme corner of it can grow and deliver bulky food-stuffs as cereals and pulses to the other.

In the case of the bulky grains, it is desirable to adopt a policy of making each trade-zone self-sufficient, where bulky grains can be moved through trade channels. Except in an emergency (as in recent years) it is not practicable to move bulky grains like *jowar* and rice, over long distances; transport charges make it uneconomic.

Certain food-materials, such as sugar, *gul*, cocorut or copra, oils, tea and coffee, which are not very bulky and which can be grown successfully in certain favoured tracts, can be moved long distances without making their prices prohibitive at the terminal end.

The general policy of food-production should allow people of different trade-zones to produce such crops as grow there successfully and profitably, instead of trying to make each small tract self-supporting in all food-materials. One cannot grow *jowari* where rain fall is more than 40 inches, nor rice where the rainfall is less than 40 inches. It may further be remembered that though *jowari* may grow well where

sugarcane and tobacco succeed, it cannot compete with sugarcane and tobacco and hence the insistence of substituting some of the cash-crops, like sugarcane and tobacco by *jowari*, will put not only the sugarcane and the tobacco grower to loss, but the whole cane and tobacco tracts will suffer financially. What is said of sugarcane and *jawari* (in the Deccan) holds good with jute and rice in Bengal.

The policy of specialization, under favourable conditions, is certainly more conducive to the total increase of products and benefits the individual farmer as well as the country alike. Moreover, a certain amount of exchange and interdependence is necessary, healthy and desirable.

The ways and means of increasing food-supply

Before making suggestions for increasing food-supply, one has either to presuppose that the reader knows what is being done in this respect or he must describe it. A detailed description will take considerable space and moreover interested readers can find it in official reports. We shall, therefore, take the middle course and allude only to certain important ways and means that are followed by Government.

The two principal methods of increasing the production of food are (a) to increase the area under food-crops and (b) to increase the production per-acre.

(a) By increasing the area under food-crops we do not mean substituting cash-crops (like sugarcane and groundnut) by rice and *jowar*. Except in certain tracts, there is a shortage of good and improved cultivable land (see Chapter III). By "good land" we mean fairly fleshy soil with sufficient rainfall and by "improved land" we mean land that is improved by breaking and levelling and by providing irrigation. There may be good lands still available in Sind, North West Frontier provinces, Punjab, Malva States and Nizam's dominions. There is very little good land in Western India, including the East-Deccan. To increase the supply of improved lands in India practically means to provide irrigation facilities, in most parts of the country.

(b) The per-acre out-turn in India is no doubt small; but it is not because the Indian cultivator (especially the cultivator in Gujerat, the West-Deccan and in Southern India) is less industrious or less intelligent than any in other countries. The Indian cultivator is doing his best in the existing conditions. If the Government provide him with better facilities for obtaining water and fertilizers, he will, we are sure, increase the per-acre out-turn very considerably. It is no use saying that Spain and Japan produce more rice and England, France, Denmark or Holland produce more wheat, per-acre, than we do. They have good land, sufficient and well distributed rainfall and every facility to obtain fertilizers. The sugarcane farmer in the Deccan and recently the rice grower in the Mavals have taken to using fertilizers and have harvested big crops. That was possible because Government provided fertilizers at reasonable prices and the market offered good prices for *gul* and rice.

Possibilities for increasing food-production

The possibilities of increasing food-production can be put under the following categories:—

(a) Irrigation
(b) Manuring
(c) Conservation of soil and soil-moisture and better cultivation
(d) Crop-breeding and seed-selection
(e) Control of crop-pests

and

(f) Education and propaganda.

We do not propose to go into the details of these. If we do, it will mean writing on Agronomy, Irrigation and General Education. This is not the place to write in detail. Moreover, each subject is important and big enough for a separate treatise. Subjects like irrigation-projects and rural education are more for experts in the lines. We hope that the Government are making plans for increasing canals and extending and improving rural education. We cannot do more than to emphasise the importance of these vital needs.

(a) **Irrigation.**—If one were to compare the percentage of irrigated to the cultivated area in India, it may be seen that India stands high above the other countries of the world. The reason is that in this tropical country, where rainfall is restricted to a short period, you cannot get good harvest, unless rain-moisture is supplemented by irrigation. In most parts of the country you cannot grow certain crops unless you provide perennial irrigation. In the circumstances it is no use saying that the per-acre yields of wheat or rice in India are smaller than those in England or Spain. Irrigation is calculated to yield 50 percent or more higher yield in India. The country has vast water resources and still for want of irrigation large tracts, well suited for irrigation, are either left unsown or produce very little.

Of all the means of producing more food in a tropical country like India, irrigation is, by far the most important. This was realised by our fore-fathers. From the time immemorial they have been diverting mountain-streams by means of channels or *pats* to irrigate rice crop, whenever break occurs in rains. There are hundreds of such *pats* in Kolhapur State. They also put small permanent dams (*bandharas*) across streams to divert water to irrigate 5 to 100 acres of *kharif* and *rabi* crops. There may be over 600 such *bandharas* in Nasik District alone. They also impound rain-water in suitable sites. There are a large number of such small ponds in Dharwar District and in the Nizam's territory. From very early times, our people baled water by wooden buckets by means of *paikotas* (or lever-lifts worked by man-power) and raised water by *mhotes* or leatherbags by bullock-power. In short, our forefathers fully realised the importance of irrigation and used all means to achieve their object. To-day we are using these as well as power-pumps for irrigating crops. Even in historic times, they constructed big diversion canals on the Indus and the Jumna in the North and some in Southern India, some of which are still useful. The British Government opened more diversion canals in the North and a few storage-lake-schemes in the Peninsula.

It may be asked why the British Government with their eminent Engineers, did not introduce more storage-lake-schemes

for the benefit of the arid-east-Deccan, side by side with diversion canals in the North and why they waited till the question came to a head. The answer is simple. In the general interest of the whole country, it was right to invest whatever money was available for irrigation on diversion canals, where the cost of construction was less and returns sure and better.

Of the major provinces, the Punjab, Sind, U. P. and Madras have claimed the *lion's* share of canal-irrigation. Bombay and the C.P. stand last. Also the percentage of irrigated to cropped area is smallest in Bombay, being only 4 percent.

In a recent leaflet (No. 3) "New projects for Irrigation and Power 1947, by the Central Board of Irrigation" quite a large number of irrigation works are proposed all over the country. The Damodar Valley project in Bengal, the Kosi Valley project in Bihar, the Girna (a tributary of the Tapti) in Khandesh, the Gangapur storage-project on the Godavary in Nasik district, the Mula storage-project in Ahmednagar district, the Ramapadsagar and the Tungbhadra projects in Madras presidency and the Mahanadi valley project in Orissa are important and when materialized they will add to the prosperity of the country.

It will be noticed that even in this new drive for irrigation, the Central Government has missed the most needy tract of the South East Deccan from Pandharpur (in Sholapur district) to Ranebenur (in Dharwar district). This tract gets very little rain and has no canals and is known as "very liable to famine". The Bombay Government have proposed the Koyana project in Satara district and the Daddi project on the Ghataprabha in Belgaum district. Of these two, the Koyana is more of a power project, though part of the power is proposed to be utilized to lift water for irrigation in the east. It is said that the water will have to be lifted over 300 feet for purposes of irrigation. The Daddi project, if materialized, will solve the problem of the precarious rainfall tract in the South East Deccan. It is expected to irrigate over 1,032 thousand acres in the rain-scarcity tract. At present, millions of acres, of good land, under the command of the proposed Daddi-canals are lying idle. If water is provided, these virgin lands will

produce bigger yields than the lands in other tracts. At present, the arid tract produces almost nothing.

India wants more irrigation

The Mahanadi scheme with its Hirakud project, the Multipurpose Damodar-valley project and the Rampada, the Machkand and the Sangameshwaram project will indeed bring prosperity. Industrial development, flood-control, prevention of the erosion of hill-sides in high altitudes and of the river banks in the plains, and most of all, irrigation throughout the country needs all such schemes if the country is to be made self-supporting in all respects.

We, however, do press the needs and the claims of the South East Deccan for immediate consideration. This tract, because of the precarious rainfall and the total absence of canal irrigation, always suffers from food-famine. The Daddi-scheme on the Ghatprabha in Belgaum district and the Koyana scheme in the Satara district are the only possible schemes which can save the tract. If the vast area, under the command of these schemes, receives water, not only will the South East Deccan get its due share and thereby prosper, but it will, it is hoped, be able to meet the present deficit in food-grains of western India, which is the fighting arm of the Indian Dominion. We, therefore, commend the two projects with all emphasis at our command.

Time has come when one cannot think in terms of dividends, as crores of rupees are required for the huge imports of food-grains. Science and Engineering have so advanced these days that between water-power and irrigation, big projects requiring large expenditure offer good prospects of fair dividend on the out-lay. At this stage, it may be remembered that it is not only the water of the projects that increases crop-yields, but the projects increase the supply of new lands also.

(b) **Manures and manuring.**—Next to water, manure is the most important factor in increasing crop-yields. It may, however, be remembered that application of manures (especially concentrated manures) may prove harmful if there be deficiency of moisture in the soil.

(i) **Cattle-dung.**—Unlike in other countries, cattle-dung, in India, is used as kitchen-fuel in most houses and as *rab* (burning and preparing seed-beds for rice and *nagli*), in heavy rainfall tracts. There is no fuel-oil nor much coal in the country and their prices are prohibitive to be used as fuel. There is insufficiency of fire-wood. Except in forest-villages, the farmer cannot get fire-wood. There are only a few good forests and their area is not well distributed. Most of them are either not well conserved or are not properly exploited. The farmer, therefore, is compelled to use cattle-dung as fuel. With all these handi-caps, it is very necessary to make every effort to save and conserve as much cattle-dung as possible for making farm-yard manure. Till the dream of making electricity available for household and farm purposes, Indian farmer has to use cattle-dung as fuel and the forest conservancy has to work under handicaps.

(ii) **Oil-seeds.**—The country is growing large quantities of oil-seeds and the oil-cake is either used as cattle-feed or manure, though in old days large quantities of oil-seeds used to be exported.

(iii) **Bones.**—At present the bones of cattle, a large potential source of phosphatic manure, are practically wasted. With planned and organised effort this source can be exploited. In recent years Kolhapur has made a good beginning in this direction. The Kolhapur Government allots about half an acre of waste-land, free of cost, to every village for opening dead-cattle where only they can be flayed. It makes the collection of bones easy. About 40 villages have taken advantage of this concession so far.

The Co-operative sale-and-purchase society, Kolhapur has installed a bone-crushing-plant at Rukdi near Kolhapur for making bone manure. If similar facilities are given in other districts and Government officials view the plan with sympathy, bone collection and crushing will provide labour to poor villagers and supply bone-meal manure for fertilizing lands.

(iv) **Leaf-mould.**—A large source of leaf-mould in the forest villages is at present wasted in India. In this respect

also, the Bombay and Kolhapur Agricultural Departments are doing useful work by way of giving subsidies to farmers who undertake to dig manure-pits for making leaf-mould.

Small as the above sources are, collectively they are bound to make a substantial supplementary addition to the much needed supply of manure.

(v) **More Fertilizer plants are required.**—Artificial manures are a recent introduction in India. Before 1908, oilcake and sulphate of ammonia were tried and used only for sugarcane on Government experimental farms. It was found that Nitrogen in oilcakes and sulphate of ammonia was cheaper as compared to that in Farm Yard manure. The Bombay Agricultural Department took up propaganda work by about 1908 and sugarcane growers were induced to apply oilcake, fish and sulphate of ammonia as top dressing to sugarcane. For some years sulphate of ammonia was given free, if cane-growers agreed to apply oilcake at their cost. During and immediately after the First World War, when prices of farm products rose, artificial manures became popular. Further fillip was given by the condition created by World War II, when it paid the farmers to apply artificial manures to irrigated crops and even to rice, in heavy rainfall tracts.

The use of concentrated manures for staple crops, like rice, wheat, *jowar* and *bajari* in India, will depend upon the market prices of agricultural produce and of the manures. Unless the additional yield defrays the cost of artificial manures, the present tendency of using such manures will be checked. Where there is less rainfall or where irrigation facilities do not exist it does not pay to apply artificial manures. Even with the present high prices of grains it does not pay the farmer to apply concentrated manures to rain-fed crops. Unless there is sufficient moisture in the soil it is risky and harmful to apply concentrated manures.

Unlike European countries, where generally temperature is low and rainfall sufficient and well distributed, the climate of India, in most parts, is dry and rainfall restricted to a short season. Except in western ghauts, Himalayas and North Eastern India rainfall, even in the short season, is not sufficient.

In these circumstances, unless irrigation is extended, the use of fertilizers will not increase appreciably.

Still in a vast country the acreage under irrigated crops is bound to be large. For the increasing population more food is required, the standard of living is rising and it is not likely that the prices of farm products will ever go down to pre-war level. Furthermore, Government have undertaken large number of irrigation projects to step-up food supply and the demand for fertilizers is bound to increase.

The pre-war annual consumption of sulphate of ammonia in India was about 1,00,000 tons. The present production of sulphate of ammonia, according to a note supplied by the Ministry of Works, Mines and Power, dated 6-6-1948, is about 76,000 tons. The present actual requirements of sulphate of ammonia and superphosphate are 50,00,000 and 7,00,000 tons respectively.

Of the present production of 76,000 tons of sulphate of ammonia, Travancore produces 50,000 tons and Mysore 6,000 tons. Besides these there are small plants at Bombay, Ambernath (Bombay), Ahmedabad, Najafgarh (Delhi), Belagula (Mysore) and Madras. Their total capacity is about 50,000 tons but they do not produce as much at present. Recently a new Company has been floated at Alwaye in Travancore which hopes to produce 50,000 tons of sulphate annually. Another fertilizer plant is being put at Sindri (Bihar). This plant is expected to produce about 3,50,000 tons of sulphate a year by 1950.

If the present annual requirements of sulphate of ammonia and superphosphate as estimated by Dr. K. A. Hammeed (quoted by the Ministry of Works, Mines and Power) are nearer the truth, even by 1950 there will remain a big gap between the requirements and the production of fertilizers.

This shows that with increased irrigation facilities there is urgent necessity of completing the Alwaye and the Sindri projects as soon as possible and encouraging similar projects in Bombay and Madras provinces.

(c) Conservation of soil and soil-moisture and better cultivation.

(i) *Protection of forest is necessary to prevent erosion of hill-sides. Similarly it is necessary to prevent erosion of the lands along the rivers.* In India the hill-sides, in the heavy rain-fall tract, are badly washed. Even in the plains, thousands of acres along the rivers, are cut-up and eroded, especially in the central belt (central India, parts of Gujerat, Malva, Berar and the North-East Deccan). Forest-covers, on the hills, were cut and care was not taken to protect the banks of the rivers for hundreds of years. The intensity of monsoon rain-fall, irrespective of the total amount, is always high and hence millions of acres have become useless. Millions of tons of surface soil is yearly washed. It is really a tragic evidence how we have squandered the heritage of acres and of irreplaceable top-soil. **Plans should be made to afforest hill-sides and reclaim eroded land along the banks of the rivers.**

(ii) Some useful work was done in recent years in the South East Deccan, especially in Bijapur district under the guidance of Sir Henry Knight. Several thousand acres were terraced and lakhs of trees were planted. The work, we learn, is stopped. Some bunds may have been broken as the officer in charge had not provided waste-weirs, thinking such weirs would not be required. But why condemn the whole work? Weirs can be put-in, wherever necessary and changes made for the future lines of work. We have seen the work and have observed the nice growth of trees along the bunds on the slopy lands. If the work is neglected, the money spent on it will be a waste and the young trees will be broken by cattle or eaten by goats.

(iii) Very useful work is done by the Bombay Agricultural Department in soil and moisture conservation. To increase out-turn by dry farming means more work on the part of the farmer. Small increase by hard labour does not appeal to the farmer, in preference to spectacular increase either by growing new varieties of crops like sugarcane or by the application of sulphate of ammonia etc. Sustained and continuous propaganda on the part of the district officers will, we hope, in course of time, be of permanent value.

(iv) **The use of tractors.**—Since Government of India is proposing to open new lands, hitherto lying idle in some of the Indian provinces for settling the refugees from Sind and West Punjab, it will be economical to break such lands with tractors rather than depend upon bullock-drawn ploughs. Moreover, though on the whole the holdings, in most parts of India, are small and unsuited for heavy agricultural machinery, there are bound to be, in every province and State some large holdings. It may also be noted that on large sugarcane plantations tractors have become indespensible. In the circumstances it is very essential to import large number of tractors. A few hundred, as we read in news-papers, will not do, if large areas are to be broken in a short space of time.

It does not mean that we recommend tractors or for the matter any heavy agricultural machinery for general use in India. In the ordinary circumstances, there is not much scope for heavy machinery. Moreover, it is doubtful if tractor-ploughing is ordinarily as good as ploughing by bullock ploughs. It is one thing to use tractor for breaking new lands or to use it on sugarcane estates (where land is manured and irrigated) and quite another to plough land which is generally sown with staple crops like *jowar*, wheat or cotton. We recommend tractor for particular purposes only.

(d) **Crop-breeding.**—Between 1906 and 1930 very useful work was done in this line. Breeding of sugarcane is the most successful achievement of that period. We are afraid the efforts are not energetically pursued. In case of certain crops such as groundnut the results, already achieved before 1920, are losing ground for want of sustained work. The varieties of groundnut, due to mixing, have deteriorated. What is achieved in sugarcane ought to encourage plant-breeders to do better in other crops.

(e) **Control of crop pests.**—Crop-pests are more serious in India where conditions are favourable for plant-pests and vermins. In storage alone the loss is supposed to be 6 to 10 percent of the produce. Very vigorous research work on practical lines is called for. There is no reason why the Entomologist should not be able to find a cheap practical method of storing grain.

(f) **Education.**—One may doubt the influence and the bearing of education on agriculture and agricultural production of the country. We, however, believe that the early education of the child and the way it is imparted by the school teacher has a lasting influence on it. The indigenous system, before the British came, bore more directly upon every-day life. The village teacher created interest in and love for agriculture and crops, which invariably surround the school. The new system, introduced after the British came in, being in the first instance intended to produce new administrative machinery, had little bearing on every-day life. The men turned out by the new system preferred Government service, clerical jobs etc. The nature of the work of the school teachers and the village-officers underwent a change and they became as mercenary as the clerks and Government officials. Emphasis of education thus shifted from every-day life, which was based on agriculture and manual labour, to sedentary work, having little or no relation to village life. In course of time the degeneration, set-in under foreign rule, made all labour (especially hired labour-whether in office school, factory or farm) indifferent. Management being impersonal, individual interest waned and hired labour became mercenary. As a result the out-put of work is small and the quality poor.

To create more interest in agriculture, the Kolhapur Darbar has in recent years, started an experiment of providing village schools with school-plots or school-gardens for the children to play with plants and crops. The inspecting staff of the Education Department are instructed to insist on the teachers to draw teaching material from agriculture. The teachers in such schools are trained teachers and are given special courses in agriculture. So far over 50 schools are given school-plots. Government have decided to give plots to all primary schools. Though it is not a comprehensive programme of training the child in its future responsibility as a citizen, it can be said to be an attempt to create in the child a love of labour and interest in its rural surroundings.

India has excessive population in relation to her land-supply.—The population at present is increasing at 10 percent every decade. Most of the populace is halfstarved. Even if

production is increased the increase in population is bound to overtake the supply of food and other necessities of life. Unless plans for increasing food-production are accompanied by plans to stabilize population, the food-production is bound to fall short of the future requirements. It is, therefore, necessary to inculcate on the minds of the young generation the necessity of controlling families. The first necessity, however, is of making primary education compulsory, in the absence of which propaganda will have very little value.

Recently Sir V. T. Krishnamachari has uttered a warning saying that if progress does not lead to higher standard of living but only to increase of population drastic changes would have to be made in the laws of succession and possibly efforts would have to be made to modify the traditional attitude in regard to birth control measures.

It is really a sign of progress in social matters that the All India Women's Conference have boldly advocated family planning and birth control. In this connection it should specially be noted that in the All India Maratha Women's conference, the president Shrimati Indumati Ranisaheb, a lady of high rank in the Royal family of Kolhapur, said that for the health of women and for the good of the society birth control was essential.

General education, designed to impress upon the child the dignity and importance of work and service, sense of responsibility of one's family and of the society, will have far reaching effects on the future of the country. How to mould the educational system, the instruction and the machinery employed is a question for the experts.

GENERAL SUGGESTIONS IN RESPECT OF KOLHAPUR STATE

We have already said that Kolhapur State can have no separate independent programme to solve its food-problem. The general suggestions, made in respect of India, cover Kolhapur State which is only a small part of India. The Kolhapur farmer is keen, intelligent and progressive. Even in the absence of canal irrigation he is irrigating a little higher percentage of cropped area than the neighbouring districts.

In no part of the country does the farmer lift river water (by series of four to five *mhotes* and by oil-engines) to grow sugarcane on such a large scale. Nowhere, perhaps, is there a sugar factory, entirely dependent on lift-irrigation as in Kolhapur State.

Kolhapur State is handicapped by its small size. Moreover, the lie of the land is such that immediately after leaving the Sahyadree the rivers dig deep and there is not much scope for flow irrigation. The late Shri Shahu Maharaja half-completed the Radhanagari dam to canalize the eastern part of the State. The work had to be stopped when World War I broke out. It was discovered later that the water of Radhanagari lake cannot be taken by canals to the eastern petas, where there is suitable area for irrigation. Any way, even the incomplete dam has saved the *gul* and the sugar industries of Kolhapur, as the water stored is found very useful in hot season, when generally the Panchganga and its tributories run short of water.

Since most of the rivers run short of water in the hot weather, the Kolhapur farmer has to put temporary earthen dams (*dharans*) to store water. There were over 90 such *dharans* in 1946, from which about 2600 series of *mhotes* (or about 10,000 single *mhotes*) and 500 to 800 oil engines lifted water for growing sugarcane. Year by year the supply of water in the rivers is failing due to the destruction of forest in the Sahyadrees, which is the heavy-rainfall tract. The erosion of hill-sides have silted rivers and it is feared that unless these hills are afforested, the supply of water in the rivers may fall much earlier in summer than at present.

It is suggested that the State should put up small dams on the rivers near their sources in the hills to store water. Such tanks will not only irrigate some area in the immediate vicinity down the dams, but will feed the temporary stores built every year. These dams will not be as large or as costly as the Radhanagari dam, which is serving the same purpose on the Bhogavati and the Panchganga.

The State has, in recent years, put up four permanent weirs across the Panchaganga. The permanent weirs naturally

hold more water than the temporary earthen dams. Such weirs on the other rivers (the Warna, Karvi, Kasari, Kumbhi, Vedganga and the Dudhganga) will be very useful The Kolhapur farmer is willing to pay for the water. He is paying for the water stored in permanent weirs recently constructed.

It is gratifying to learn that the Kolhapur Government has ear-marked a sum of six lakhs of rupees for giving loans to farmers for digging wells in the course of next six years. A cultivator can get up to Rs. 2000 at 2 per cent interest per annum repayable in four instalments, two years after the completion of a well. The loan of one lakh of rupees sanctioned for 1947–48 is, we learn, already advanced.

The permanent weirs on the Panchganga and the loans for wells are indeed a great help in stepping up food-production and it is very desirable to extend such work. Such small works, however, cannot solve the food problem of coming years.

If the two big projects (the Koyana and the Daddi projects) referred to under "possibilities of increasing food-production" in India, fructify, the food-problem of Kolhapur, along with that of the Western India, will be solved even for the future. The left-bank canal on the Ghatprabha is expected to provide water to about 33,000 acres in Raibag Mahal and the Right bank canal to about 57,000 acres in Katkol-Torgal, the scarcity tract of the State. The lands are good and very suitable for irrigation, but for want of rainfall they produce very little at present.

Forest and afforestation.—Kolhapur State lies in the rain-shadow of the Sahyadree (the home of Kolhapur forests). Sahyadree and its spurs have very great influence on the water-supply and the agriculture of the State. The forests are neglected during the last 100 years and the effects of their destruction are plainly seen. Timber and wood supply is short and the rivers, being silted, run short of water. With a view to staying the harrowing effects the Regency Council took up the question of stopping further destruction of forest. The Council appointed a retired Forest officer from Bombay and reorganised and strengthened the forest department. A

working plan was made and the work, including afforestation, was started. Regeneration of forest takes 30 to 60 years. Before any visible results were seen the policy seems to have been changed. Instead of stopping *kumari* or the shift-cultivation, large areas from forests are being given for cultivation. This may bring a temporary relief to a few cultivators, but the bad after-effects of breaking the poor forest lands will more than offset the temporary relief out-of-all-proportions. We are now seeing the effects of forest destruction which took place from 1800 to 1850 and lamenting over these. Attempts were just in hand to arrest the effects when they are ignored. The food-problem of Kolhapur is closely connected with Kolhapur forests and in the interest of the future generations, it is hoped, that the policy adopted by the Regency Council in 1941-42 is not lightly brushed aside.

In the last few paras we have attempted to show in brief what the Government of India and Kolhapur are doing to step-up food-production. We have commented on these and made our humble suggestions, approving many and laying emphasis on the very useful projects.

It is hoped that our suggestions receive attention of the authorities concerned.

PART IV

APPENDICES

APPENDIX A

Available information regarding the total production of food crops in India and the Kolhapur State not reliable

In this note we give our reasons for making the above statement. We will first examine the sources of information of All-India and then those of Kolhapur State.

India.—For food-rationing purposes in recent years, Government officers and other investigators have found it difficult to reconcile the quantities of food-grains, imported into the country, with the gap between the total consumption of food-grains (arrived at on the basis of one pound grain-ration per head of population per day) and the calculated total production of food-grains in the country. We found the same difficulty and have come to the conclusion that *the per-acre out-turns, assumed by the Provincial Revenue Departments are not nearer the actuals. They are taken at high level.*

The total produce of each crop is generally found by multiplying the number of acres under that crop, by the average per-acre yield. The average per-acre yields, in the quinquennial returns, are arrived at on the basis of crop-cutting experiments. There is perhaps no other better method in our country. For the vast areas, however, the number of crop-cutting tests are too small. While there was free movement of grain there was no occasion to doubt the total production. Quantities of imports, which were expected to fill in the gap between the consumption and the assumed production, could not do so and hence investigators began to doubt the statistics of production.

It is only in the recent rationing period that people took serious doubts about the total production of food-grains in the country, when they found that Government could not give more than certain quantity (say 14 to 16 ounces) of food-grains per-head per day even after importing about 2·3 million tons of food-grains a year.

In the following table are given the average out-turns per-acre of important food-grain-crops given by Dr. W. Burns,[1] Sir Manilal Nanavati[2] and those assumed by us.

Table showing average out-turns in pounds per acre, of some of the important food-grain-crops.

Name of crop	By the author of this note	By Dr. W. Burns	By Sir Manilal Nanavati
1	2	3	4
Jowari	450	100 to 700	...
Bajari	200	320	...
Rice (Paddy)	600	1,109	1,240 (for India)
			912 (for Bombay)
Rice (clean)	420	...	...
Wheat	...	...	685 (for India)
			385 (for Bombay)
Nagli (*ragi*)	500	...	...
Maize	500	...	803 (for India)
Small millets	500	...	...
Gram	300	350 (for Bombay)	...
Peas	250	...	...
Other pulses	300	...	...

The per-acre out-turns, given in column 2, are ours. Out-turns of rice is generally given as paddy. Since for rationing purposes clean rice is considered, paddy out-turn is converted into clean rice. One hundred pounds of paddy make 70 lbs. of clean rice. Though the per-acre out-turns, assumed by us, are small as compared to those given by Dr. Burns and Sir Manilal, we think that even our conservative averages are not generally obtained.

If we calculate the total grain produce on the basis of the per-acre out-turns given by Dr. Burns and Sir. Manilal, we find that the production alone should meet the food-grain requirements of India. As a matter of fact, the production plus the heavy imports, in recent years, are not found sufficient to provide even the moderate grain-ration of one pound.

1. Technological possibilities of Agricultural Development in India 1944, pp. 58, 68.

2. Indian Rural Problem 1944, pp. 34, 35.

Our presumption, that the average out-turns per-acre, given by Dr. Burns are larger than are obtained, can be proved if we compare his calculated production with the present consumption of food-grain, produced in India and supplemented by the imports.

Dr. Burns puts the production of major food-grains (i. e. rice, wheat, barley, *jowar*, *bajari* and gram) at 48.2 million tons a year (vide statement on page 36 of his note referred to above). It may be noted that the production, of *ragi*, other inferior millets and pulses other than gram, is not included in the 48·2 million tons. According to him these crops occupy 33 million acres (statement 8 of his note). Taking the out-turn of these at 450 lbs. per acre, as in the case of *jowar*, their out-turn comes to about 6·7 million tons. Thus according to Dr. Burns, the total production of cereals and pulses for British India comes to 55 million tons.

According to Dr. Burns (vide statement 33 of his note) the areas, sown in British India and All-India are 214 and 281 million acres respectively. Proportionately, therefore, All-India should produce annually 72·2 million tons of food grains. The population of All-India in 1941 was 388·9 millions. At 10 percent increase every ten years, it may be 412·2 millions (or 345 million consumption-units) in 1947.

If the 72·2 million tons of food grains are distributed over 345 million consumption-units, each unit ought to get daily about 20·5 ounces, whereas the assumed production together with 2·3 million tons of imports are not enough to provide even 14 to 16 ounces per day per unit. This clearly shows that *the production, assumed by Dr. Burns, is not obtained in practice, which means that the out-turns assumed by Dr. Burns and Sir Nanavati are far too high.* According to us the total production should be 53·9 million tons (Chapter III page 19).

APPENDIX B

An Explanatory Note showing how the requirements of seed for sowing purposes and an allowance for losses, due to vermins and wastage in storage, are calculated and deducted from the gross produce, before arriving at the quantities available as human food.

It must be noted that the gross out-turn of food-grains, as gathered from the fields, is not available as food. From the gross produce some quantity is required to be kept for seed and some is lost in storage, due to wastage and vermins. After deducting these we get the net quantities available for consumption as food.

(a) **Seed-requirement.**—We have taken the following seed-rate, per-acre, to calculate the total seed-requirements for the area under cultivation.

Name of crop	Seed rate per acre lbs.	Name of crop	Seed rate per acre lbs.
Jowari	7	Other millets	10
Bajri	11	Gram	40
Rice (clean)	35	Peas	40
Wheat	40	Pulses (including peas)	15
Nagli	5	Pulses (excluding peas)	20
Maize	11		

As a matter of fact paddy is sown as seed. The seed rate of paddy is 50 lbs. (equivalent to 35 lbs. of clean rice). In preparing Appendix E 1 (for the year 1852–53), the quantity, however, is calculated in a different way. For this year, though the total production of grain is available, the area sown under grain crops is not known. So instead of taking seed-rate per acre, we had first to find out the seed-rate per hundred pounds of out-turn.

The following gives the percentage of seed requirements to the out-turn :—

Name of crop	Percentage of seed to out-turn	Name of crop	Percentage of seed to out-turn
Jowari	1·6	Maize	2·2
Bajri	5·5	Other cereals	2·0
Rice (clean)	8·3	Gram	13·3
Wheat	11·4	Peas	16·0
Nagli	1·0	Other pulses	5·0

(b) Allowance for losses due to vermins and wastage in storage.—

Name of crop	Wastage per 100 pounds of out-turn lbs.	Name of crop	Wastage per 100 pounds of out-turn lbs.
Jowari	5	Other cereals	4
Bajri	5	Gram	6
Rice (clean)	6	Peas	6
Wheat	6	*Tur*	6
Nagli	4	Other pulses	5
Maize	5		

This is found by making inquiries with a number of farmers and checked with the experience of the Food-Supply Department who had to store grains before issuing to the consumers.

APPENDIX C1

A NOTE ON THE IMPORTS OF FOOD-GRAINS INTO KOLHAPUR STATE FOR THE YEARS 1944, 1945 AND 1946 (DURING FOOD RATIONING PERIOD)

The following statement gives an extract of the note, supplied by the Controller of food-supplies, Kolhapur State, dated 24-2-1948:—

Name of Food-grains	1944		1945		1946	
	Bags	Rs.	Bags	Rs.	Bags	Rs.
1 Rice	52,317	21,94,884	60,380	25,26,297	60,497	20,74,214
Kani	1,240	...	...	...	...	...
Paddy	800	...	...	...	...	...
2 *Jowar*	1,68,443	39,38,501	21,032	4,74,097	21,332	5,04,465
3 *Bajri*	43,232	11,46,396	80	1,759	1,429	39,642
4 Maize	...	...	...	...	41,575	12,50,942
5 Wheat	57,365	16,22,822	12,755	3,47,441	1,12,458	31,06,177
Maida (*Pithi*)	13,475	5,76,514	11,644	4,75,378	5,600	1,34,190
Soji (*Rava*)	3,988	1,79,852	3,641	1,60,033	2	88
Atta	...	...	...	...	8,989	2,33,192
6 Gram	13,578	3,78,990	200	6,263	1,116	36,011
Gram *dal*	10,646	3,49,601	...	...	16,310	4,98,875
Besan	2,074	68,506	2	66	...	...
7 *Toor*	7,148	1,79,328	...	...	12,442	4,37,235
Toor dal	...	...	...	...	...	...
8 *Moog*	3,220	78,050	...	...	7,040	1,96,706
9 *Masur*	...	...	...	...	3,242	98,922
Total ...	3,77,526	1,07,13,444	1,09,734	39,91,334	2,92,032	86,10,662

The total number of bags of different food-materials comes to 7,79,292 or on an average 2,59,764 per year. The total cost, F.O.R. Kolhapur Railway station, comes to Rs. 2,33,15,440 or annually Rs. 77,71, 873. To get a more definite idea as to the quantity it is necessary to get the weight of the grain in the bags imported. Grains of different kinds vary in weight. Semi-processed out-turn of the same grain vary in weight. We, therefore, have converted paddy (unhusked rice) and *kani*

(broken rice) into clean paddy, wheat products (*Maida, soji, atta* and *pithi*) into wheat and *dal* and *besan* into entire pulse grains. The Controller has supplied the number of bags of each kind and their gross weight. It was necessary to deduct the weight of empty bags. We have further worked out the average of three years. To get an idea of how much of each kind of imported food-stuff goes to the share of each person per day, the quantities are divided between the average population of 1941 to 1945. As worked elsewhere the population comes to 12,10,000 or 10,16,400 consumption-units for this group of years.

The following table, worked on the lines explained above, gives the quantity of avarage imports, their average cost and also the quantities of different kinds of imported grain per consumption-unit per year and per day.

Name of food-grain	Average annual imports in 1944 1945 and 1946 lbs.	Quantity available per consumption-unit per annum lbs.	Quantity available per consumption-unit per day ozs.	Cost of average annual imports Rs.
Cereals				
1 *Jowari*	1,44,40,280	14·21	0·62	16,39,021
2 *Bajri*	30,20,018	2·97	0·13	3,95,932
3 Rice (clean)	1,15,17,732	11·33	0·50	22,65,132
4 Wheat	1,39,17,745	13·69	0·60	22,78,563
5 Maize	24,04,421	2·37	0·10	4,16,981
Total ...	4,53,00,196	44·57	1·95	69,95,629
Pulses				
1 Gram	36,38,846	3·58	0·16	4,46,193
2 *Tur*	13,48,445	1·33	0·05	2,05.521
3 *Mug*	2,20,570	0·22	0·01	91,586
4 *Masur*	2,16,674	0·21	0·01	32,974
Total ...	54,24,535	5·34	0·23	7,76,184
Grand Total ...	5,07,24,731 lbs. or 22,645 tons	49·90	2·19	77,71,813

It will thus be seen that the State was importing on an average 22,645 tons a year and yet this quantity could not fill in the gap between the requirements of and the production in the State and ration had often to be reduced to 14 and even 12 ounces per day.

The average annual cost (Rs. 77, 71,813) is the landing cost at Kolhapur Railway station. It does not include transport from the Railway station to the godowns and from there to the consumers in the cities and villages. Apart from transport and godown charges Government had to maintain a big Department. Such costs, on account of transport, godown and Food Supply Department, are not available. If these are taken at 12 pet cent on the landing cost, the total cost on account of imported food-grains will exceed Rs. 87 lacs.

APPENDIX C_2

A Note on the production of grain-crops in the forest area in Kolhapur State.

Village revenue-statistics in India deal only with the "assessed land." Season-and-crop-reports and Estimates-of-area-and-yield, are prepared from these statistics, at district headquarters and hence the area under crops and their yield from the "unassessed land" do not appear in such revenue statistics. While considering food-problem, one cannot ignore the produce of food-crops in the forest area which falls in the category of "unassessed lands." There is considerable area in forests under rice, *nagali* and other small millets. The low-lying rice land (in the forest) is cultivated every year; while the lands on hill-sides are cultivated for three years and then fallowed seven to twenty years, according to the nature of the soil.

With a view to ascertain the contribution of such cultivation towards the food production of the State, inquiries were made with the Conservator of forest, Kolhapur and the Karbharis of Jaghirs in the State. Some of the divisions of the State proper and only Vishalgad, Bavda and Ichalkaranji Jaghirs have some lands, in the forest, which grow food crops. The following gives the areas:—

	Area under cultivation in the forest. Acres
Kolhapur State (proper)	1,110
Vishalgad Jahagir	5,178
Bavdā ,,	833
Ichalkaranji ,,	900
Total	8,021

The total out-turn from 8,021 acres, at 500 lbs. per acre, is estimated at 40,10,500 pounds of grain per year. Deducting 57,825 pounds for seed and 1,60,420 pounds for wastage, due to virmins and storage (as worked in Appendix B) 37,92,255 pounds or 1,692 tons of grains from the forest area are available as food per annum. This quantity makes 3·73 pounds of grain per consumption-unit per year or 0·16 ounce per-day.

APPENDIX D

A note on food-materials, other than cereals and pulses, entering into the diet of average person in Kolhapur State.

Under Indian conditions, it is difficult to find out the quantities of food materials other than cereals and pulses, as they form a small part of the ration. Moreover, some of the food-materials, such as vegetables and some kind of fruit, are available to the poor and the middle-classes, only in certain seasons. With a view to get some idea of the quantities of vegetables and fruits the people get, an investigation was made by Survey Method, with the help of the district staff of the Agricultural Department. The average quantities of food-materials obtained were further discussed in a small meeting of district officers, before arriving at final conclusions.

In the case of *gul*, sugar, oil, milk and groundnut, the quantities are worked out from the total production in the State, after giving due consideration to the imports and exports.

For finding out the different quantities of food materials, per consumption-unit per day, we have taken the consumption-units of the group 1940–41 to 1944–45, which come to 10,16,400. It may also be noted that the consumption-unit makes no difference between the rich and the poor nor between the vegetarian and the non-vegetarian.

Gul.—According to the information supplied by the Merchants' Association, Shahupuri, Kolhapur, about 12,000 tons of *gul* is annually consumed in the State, which means 1·2 ounces per consumption-unit per day. By the Survey Method the quantity comes to 1·5 ounces. The Committee have taken one ounce of *gul* as the probable quantity consumed, per head per day.

Sugar.—Sugar was rationed in the State for the last three years, when it was found that annually 4,770 tons of sugar was distributed for consumption. According to this, the quantity,

per consumption-unit per day, comes to 0·46 ounce. By Survey Method the quantity per head per day comes to 0·42 ounce. The Committee accepted the first figure, namely, 0·46 ounce.

Oils.—According to Survey Method the quantity per head per-day comes to 0·91 ounce, the Committee took 1·1 ounces of oil, per head per day, as the probable average.

Milk and milk-products.—In a special investigation on cattle and milk-supply in Kolhapur State by the author, the quantity, per head per day, comes to 2·9 onnces.

Meat.—The sources of meat are mainly sheep and goat, supplemented by fowl and wild game. According to quinquennial cattle-census 1940, the total number of sheep and goat in the State was 2,56,192. Taking 30 percent of these available for meat every year, at 20 lbs. of meat per animal, the quantity of mutton available, per consumption-unit per day, comes to 0·07 ounce. The consumption of poultry is of no quantitative importance.

Eggs.—According to Live-stock Census Report the State had 1,10,527 hens in the year 1940. Taking egg-production at 50 eggs per annum, per hen and the weight of an egg at 1·45 ounces, the average cosumption of eggs, per consumption-unit, comes to 4 eggs a year or 0·01 ounce per day.

Fish.—Fish is taken occasionally and forms a very small part of the meal. The probable quantity of fish may be taken at 0.04 ounce, per consumption-unit per-day.

Condiments.—It is difficult to get the quantity consumed per day of condiments and spices, though they are present in the diet of every person. We have taken 0·5 ounce of condiments per head per-day. It may be noted that this quantity consists mostly of onions garlic, and chillies and coriander, with a little cumin and asafœtida etc.

Vegetables.—Vegetables are not common in the daily diet of the average person. Bulk of the vegetables in villages comes from the bunds in the fields. Wild green-vegetables are gathered by poor people in rainy season. By Survey Method the quantity of all kinds of vegetables comes to 2·76 ounces per consumption-unit per-day.

Fruit.—Fruits are beyond the means of the masses. Wild fruit and berries are available in certain seasons. By Survey Method the quantity comes to 1·8 ounces.

Groundnut.—The State generally grows about 1,16,000 acres of groundnut. While gathering crop, the harvesters are allowed to eat nuts and are given about 10 percent of their collections as wages. At 1,000 lbs. of pods per acre, the total gross produce of the State would be 11,60,00,000 lbs. Ten percent of this (or 1,16, 00,000 lbs.) given as wages, is probably consumed as nuts. At 70 percent Kernels to pods, the harvesters' share comes to 81,20,000 lbs. of Kernels. This works out at 0·35 ounce per consumption-unit per-day.

APPENDIX E

An Explanatory Note showing how the appendices E 1 to E 6, relating to the production of food-grains and their net quantities available for human consumption as food in Kolhapur State, are compiled.

In appendices E 1 to E 6, we have worked out the aggregate production of food-grains and their net quantities, after making allowance for seed purposes and the losses, in storage and due to vermins, at different periods, from 1852–53 to 1940–41 to 1944–45.

How much seed of different kinds of crops is required per acre and how much grain of each kind is lost in storage and due to vermins is explained in appendix B.

Appendix E 1 deals with food-grain production and quantities of food-grains available per head per day in Kolhapur State in 1852–53. Similarly Appendices, E 2, E 3, E 4, E 5 and E 6, deal with 1881–82, 1893–94 to 1897–98, 1915–16 to 1919–20, 1935–36 to 1939–40 and 1940–41 to 1944–45 respectively.

Appendix E 1.—It deals with the year 1852–53. The out-turns are taken from Major Graham's Report (page 12). He has not given the areas under different crops. He, however, has given the produce of food-grain crops in old measure maunds, which we have converted into pounds according to the following equivalents :—

One old measure maund of *jowar* weighs	170 lbs.
One old measure maund of paddy ,,	141 lbs.
One old measure maund of wheat ,,	174 lbs.
One old measure maund of gram ,,	170 lbs.
One old measure maund of *tur* ,,	174 lbs.
One old measure maund of *nagli* and other millets weighs	170 lbs.

A word about the total out-turn given by Major Graham is necessary. The total annual production of food-grains given by Major Graham for Kolhapur State, is too high in our opinion. Some people think that due to neglect of agriculture the per-acre yields have fallen now.

The present per-acre yield of lands (good and poor taken together) is lower than before ; but this is not due to the neglect of Agriculture or even the exhaustion of soil. Good lands, with the same manure and care, give even to-day as much out-turn as in old days. The cause of lower yield to-day lies in the fact that in old days, only good lands were cultivated and naturally their per-acre out-turn was higher than the average of good and poor lands now under cultivation. In 1852–53, the area under cultivation was 3,40,000 acres, while in 1942–43 it was 9,24,648 acres The recent increase is due to the addition of marginal land and hence the present average out-turn is lower. We don't think that agriculture is neglected or soils are exhausted. With good care, soils cannot exhaust rapidly as is supposed by some. The out-turns of cotton, sugarcane tobacco and groundnut have decidedly increased, due to more care bestowed on them. These cash-crops receive more manure than the staple grain-crops. Apart from the increase in cropped area, one has to remember that in old days there were more cattle * in proportion to the cultivated area and naturally there was more cattle-dung for the comparatively smaller area of good land.

We, therefore, think that Major Graham's per-acre out-turns at best can be accepted in the good lands with sufficient manure.

The area under grain crops in 1881–82 is taken from Kolhapur Gazetteer and for other years from the State administration reports.

In arriving at the total annual production of food-grains and the supply of these per consumption-unit per day in Kolhapur State for 1881–82, 1893–94 to 1897–98, 1915–16 to 1919–20, 1935–36 to 1939–40 and 1940–41 to 1944–45, we have assumed the per-acre out-turn given in column two of the statement appearing in the opening paras of Appendix A. For the year 1852–53 the out-turn is taken from Major Graham's

* In 1852–53 there were 3,11,721 milch and drought cattle and the land under cultivation 3,40,000 acres, while in 1942–43, there were 2,42,660 milch and drought cattle for 9,24,648 acres. This means in 1852–53 there were 91 cattle for every 100 acres of cultivated land whereas in 1942–43 there were only 26 for every 100 acres.

Report (page 12). The production given in *maunds* is turned in pounds. In the case of paddy it is further converted into clean rice at 70 percent of clean rice to paddy. Thus the production of rice, in 1852–53 given by Major Graham as 10,02,570 old *maunds* (at 141 lbs. per maund and 70 percent clean rice to paddy), comes to 9,89,53,659 lbs.

Suggestion.—We have tried to show that the Imperial and Provincial figures of grain production are too high. Similarly we have given our reasons why we cannot accept Major Graham's per-acre out-turns. In the past there were no occasions to scrutinize these figures as at present. No question had arisen to reconcile the total consumption of food grains with the production and imports. Due to the food control and rationing, there is a good deal of information on imports, exports and estimates of production and India's food requirements. This is the opportune time for revising per-acre and total production in different units of the Indian Federation. **We strongly urge that the Central, Provincial and State Governments should, after inquiry, revise the present per-acre out-turns of crops and the total production.**

APPENDIX E 1

Food grain production and quantity available per head per day in Kolhapur State in 1852-53
Population 5,46,156 (or consumption-units 4,58,771)

Serial No.	Name of crop	Quantity of grain produced		Deductions			Quantity available for consumption. Col. 4 minus Col. 7	Quantity available per consumption-unit per annum	Quantity available per consumption-unit per day.
		Maunds (old measure)	lbs.	Seed	Wastage in storage and due to vermins	Total Cols. 5+6			
				lbs.	lbs.	lbs.	lbs.	lbs.	Ozs.
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	6,26,904	10,65,73,680	17,05,179	53,28,684	70.33,863	9,95,39,817	216.97	9.51
2	Rice	10,02,570 (paddy)	9,89,53,659 (clean rice)	82,13,154	59,37,220	1,41,50,374	8,48,03,285	184.85	8.10
3	Wheat	1,09,510	1,90,54,740	21,72,240	9,52,737	31,24,977	1,59,29,763	34.72	1.52
4	*Nagli* and other cereals	3,62,561	6,16,35,370	9,24,531	24,65,415	33,89,946	5,82,45,424	126.96	5.57
	Total cereals	21,01,545	28,62,17,449	1,30,15,104	1,46.84,056	2,76,99,160	25,85,18,289	563.50	24.70
	PULSES								
1	Gram	1,28.393	2,18,26,810	29,02,966	13,09,609	42,12,575	1,76,14,235	38,39	1.68
2	*Tur*	54,308	94,49,592	4,72,480	4,72.480	9,44,960	85,04,632	18.54	0.81
	Total pulses	1,82,701	3,12,76,402	33,75,446	17,82,089	51.57,535	2,61,18,867	56.93	2.49
	Total	22,84,246*	31,74,93,851	1,63,90,550	1,64,66,145	3,28,56,695	28,46,37,156	620.43	27.20

* The figures are taken from the Statistical Report of Kolhapur by Major Graham.

APPENDIX E 2

Food grain production and quantity available per head (i. e. consumption-unit) per day in Kolhapur State in 1881-82

Population 8,00,139 (or consumption-units 6,72,159)

Serial No.	Name of crop	Area	Out-turn	Deductions			Quantity available for consumption Col. 4 minus Col. 7	Quantity available per consumption-unit, per annum	Quantity available per consumption-unit per day
				Seed	Wastage in storage and due to vermins	Total Cols. 5+6			
		Acres	lbs.	lbs.	lbs.	lbs.	lbs	lbs.	Ozs.
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	2,60,197	11,70,88,650	18,21,379	58,54,433	76,75,812	10,94,12,838	162·78	7·14
2	*Bajri*	32,570	65,14,000	3,58,270	3,25,700	6,83,970	58,30,030	8·67	0·38
3	Rice (clean)	89,038	3,73,95,960	31,16,330	22,43,758	53,60,088	3,20,35,872	47·66	2·09
4	Wheat	10,014	35,04,900	4,00,560	1,75,245	5,75,805	29,29,095	4·36	0·19
5	*Nagli*	82,980	4,14,90,000	4,14,900	16,59,600	20,74,500	3,94,15,500	58,64	2·57
6	Maize	3,295	16,47,500	36,245	82,375	1,18,620	15,28,880	2·27	0·10
7	Other cereals	47,685	2,38,42,500	4,76,850	9,53,700	14,30,550	2,24,11,950	33·34	1·46
	Total cereals	5,25,779	23,14.83,510	66,24,534	1,12,94,811	1,79,19,345	21,35,64,165	317 73	13·93
	PULSES								
1	Gram	17,738	53,21,400	7,09,520	3,19,284	10,28,804	42,92,596	6·39	0·28
2	Peas	4,470	11,17,500	1,78,800	67,050	2,45,850	8,71,650	1·30	0·06
3	Other Pulses	33,709	1,01,12,700	5,05,635	5,05,635	10,11,270	91,01,430	13·54	0·59
	Total pulses	55,917	1,65,51,600	13,93,955	8,91,969	22,85,924	1,42,65,676	21·22	0·93
	Total	5,81,696	24,80,35,110	80,18,489	1,21,86,780	2,02,05,269	22,78,29,841	338·95	14·86

APPENDIX E 3

Food grain production and quantity available per head (i. e. consumption-unit) per day in Kolhapur State for the group of years 1893-94 to 1897-98

Population 9,10,911 (or consumption-units 7,64,409)

Serial No.	Name of crop	Area	Out-turn	Deductions			Quantity available for consumption Col. 4 minus col. 7	Quantity available per consumption-unit, per annum	Quantity available per consumption-unit per day
				Seed	Wastage in storage and due to vermines	Total Cols 5+6			
		Acres	lbs.	lbs.	lbs,	lbs.	lbs.	lbs.	Ozs.
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	2,81,392	12,66,26,400	19,69,744	63,31,320	83,01,064	11,83,25,336	154·79	6·79
2	*Bajri*	56,395	1,12,79,000	6,20,345	5,63,950	11,84,295	1,00,94,705	13·21	0·58
3	Rice (clean)	1,61,558	6,78,12,360	56,51,030	40,68,742	97,19,772	5,80,92,588	76·00	3·33
4	Wheat	11,586	40,55,100	4,63,440	2,02,755	6,66,195	33,88,905	4·43	0·19
5	*Nagli*	1,12,834	5,64,17,000	5,64.170	22,56,680	28,20,850	5,35,96,150	70·11	3·07
6	Maize	8,241	41,20,500	90,651	2,06,025	2,96,676	38,23,824	5·00	0·22
7	Other cereals	1,41,061	7,05,30,500	14,10,610	28,21,220	42,31,830	6,62,98,670	86·73	3·80
Total cereals		7,72,967	34,08,40,860	1,07,69,990	1,64,50,692	2,72,20,682	31,36,20 178	410·28	17·98
	PULSES								
1	Gram	24,286	72,85,800	9,71,440	4,37,148	14,08,588	58,77,212	7·69	0·34
2	Peas	17,051	42,62,750	6,82,040	2,55,765	9,37,805	33,24,945	4·35	0·19
3	Other pulses	60,390	1,81,17,000	9,05,850	9,05,850	18,11,700	1,63,05,300	21·33	0·94
Total pulses		1,01,727	2,96,65,550	25,59.330	15,98,763	41,58,093	2,55,07,457	33·37	1·46
Total		8,74,694	37,05,06,410	1,33,29,320	1,80,49,455	3,13,78,775	33,91,27,635	443·65	19·45

APPENDIX E 4

Food grain production and quantity available per head (i. e. consumption unit) per day in Kolhapur State for the group of years 1915–16 to 1919–20

Population 8,33,726 (or consumption-units 7,00,330)

Serial No.	Name of crop	Area	Out-turn	Deductions			Quantity available for consumption Col. 4 minus col. 7	Quantity available per consumption-unit, per annum	Quantity available per consumption-unit per day
				Seed	Wastage in storage and due to vermins	Total Cols. 5+6			
		Acres	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Ozs.
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	2,65,253	11,93,63,850	18,56,771	59,68,193	78,24,964	11,15,38,886	159·27	6·98
2	*Bajri*	55,144	1,10,28,800	6.06,584	5,51,440	11,58,024	98,70,776	14·09	0·62
3	Rice (clean)	1,57,331	6,60,79,020	55,06,585	39,64,741	94,71,326	5,66,07,694	80·83	3·54
4	Wheat	12,918	45,21,300	5,16,720	2,26,065	7,42,785	37,78,515	5·40	0·24
5	*Nagli*	1.29,449	6,47,24,500	6,47,245	25,88,980	32,36,225	6,14,88,275	87·80	3·85
6	Other cereals	1,61,442	8,07,21,000	16,14,420	32,28,840	48,43,260	7,58,77,740	108·35	4·75
Total cereals		7,81,537	34,64,38,470	1,07,48,325	1,65,28,259	2,72,76,584	31,91,61,886	455·73	19·98
	PULSES								
1	Gram	22,861	68,58,300	9,14,440	4,11,498	13,25,938	55,32,362	7·90	0·35
2	Other pulses	79,441	2,38,32,300	15,88,820	11,91,615	27,80,435	2,10,51,865	30·06	1·32
Total pulses		1,02,302	3,06,90,600	25,03,260	16,03,113	41,06,373	2,66,84,227	37·96	1·66
Total		8,83,839	37,71.29,070	1,32,51,585	1,81,31,372	3,13,82,957	34,57,46,113	493·69	21·64

APPENDIX E 5

Food grain production and quantity available per head (i. e. consumption-units) per day in Kolhapur State for the group of years 1935-36 to 1939-40

Population 10,38,077 (or consumptionunits 8,71,985)

Serial No.	Name of crop	Area	Out-turn	Deductions			Quantity available for consumption Col. 4 minus col. 7	Quantity available per consumption-unit, per annum	Quantity available per consumption-unit per day
				Seed	Wastage in storage and due to vermines.	Total Cols. 5+6			
		Acres	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Ozs.
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	1,62,762	7,32,42,900	11,39,334	36,62,145	48,01,479	6,84,41,421	78·49	3·44
2	*Bajri*	30,989	61,97,800	3,40,879	3,09,890	6,50,769	55,47,031	6·36	0·28
3	Rice (clean)	1,68,825	7,09,06,500	59,08,875	42,54,390	1,01,63,265	6,07,43,235	69·66	3·05
4	Wheat	12,888	45,10,800	5,15,520	2,25,540	7,41,060	37,69,740	4·32	0·19
5	*Nagli*	1,49,093	7,45,46,500	7,45,465	29,81,860	37,27,325	7,08,19,175	81·22	3·56
6	Other cereals	1,55,221	7.76,10,500	15,52,210	31,04,420	46,56,630	7,29,53,870	83·66	3·67
	Total cereals	6,79,778	30,70,15,000	1,02,02,283	1,45,38,245	2,47,40,528	28,22,74,472	323·71	14·19
	PULSES								
1	Gram	25,353	76,05,900	10,14,120	4,56,354	14,70,474	61,35,426	7·04	0·31
2	Other pulses	73,534	2,20,60,200	14,70,680	11,03,010	25,73,690	1,94,86,510	22·35	0·98
	Total pulses	98,887	2,96,66,100	24,84,800	15,59,364	40,44,164	2,56,21,936	29·38	1·29
	Total	7,78,665	33,66 81,100	1,26,87,083	1,60,97,609	2,87,84,692	30,78,96,408	353·10	15·48

APPENDIX E 6

Food grain production and quantity available per head (i. e, consumption-unit) per day in Kolhapur State for the group of years 1940-41 to 1944-45

Population 12,10,000 (or consumption-units 10,16,400)

Serial No.	Name of crop	Area	Out-turn	Deductions			Quantity available for consumption col. 4 minus col. 7	Quantity available per consumption-unit, per annum	Quantity available per consumption-unit per day
				Seed	Wastage in storage and due to vermins	Total Cols. 5+6			
		Acres	lbs.	lbs	lbs.	lbs.	lbs.	lbs.	Ozs
1	2	3	4	5	6	7	8	9	10
	CEREALS								
1	*Jowari*	1,85,068	8,32,80,600	12,95,476	41,64,030	54,59,506	7,78,21,094	76·57	3·36
2	*Bajri*	49,651	99,30,200	5,46,161	4,96,510	10,42,671	88,87,529	8·74	0·38
3	Rice (clean)	1,61,148	6,76,82,160	56,40,180	40,60,930	97,01,110	5,79,81,050	57·05	2·50
4	Wheat	16,517	57,80,950	6,60,680	2,89,048	9,49,728	48,31,222	4·75	0·21
5	*Nagli*	85,285	4,26,42,500	4,26,425	17,05,700	21,32,125	4,05,10,375	39.86	1·75
6	Other cereals	1,25,529	6,27,64,500	12,55,290	25,10,580	37,65,870	5,89,98,630	58·05	2·54
	Total cereals	6,23,198	27,20,80,910	98,24,212	1,32,26,798	2,30,51,010	24,90,29,900	245·01	10·74
	PULSES								
1	Gram	15,279	45,83,700	6,11,160	2,75,022	8,86,182	36,97,518	3·64	0·16
2	*Tur*	29,429	88,28,700	4,41,435	5,29,722	9,71,157	78,57,543	7·73	0·34
3	Other pulses	34,843	1,04,52,900	5,22,645	5,22,645	10,45,290	94,07,610	9·26	0·41
	Total pulses	79,551	2,38,65,300	15,75,240	13,27,389	29,02,629	2,09,62,671	20·62	0·90
	Total	7,02,749	29,59,46,210	1,13,99,452	1,45,54,187	2,59,53,639	26,99,92,571	265·64	11·64

APPENDIX

Table showing percentages of important food consti- of these food-

Name of food-stuff	Botanical name	Protein percent	Fat (Ether Extracts) percent	Carbo-Hydrate percent
1	2	3	4	5
CEREALS				
Bajri	Pennisetum typhoideum, Rich.	11·6	5·0	67·1
Jowar	Andropogon sorghum, Brot.	10·4	1·9	74·0
Italian millet	Setaria italica, Beauv.	12·3	4·7	60·6
Maize, dry	Zea mays, L.	11·1	3·6	66·2
Vari	Panicum miliaceum, L.	12·5	1·1	68·9
Rice raw (Home pounded)	Oryza sativa, L.	8·5	0·6	78·0
Rice raw (Milled)	,, ,,	6·9	0·4	79·2
Sava	Panicum miliare, L.	7·7	4·7	63·7
Wheat, whole	Triticum vulgare, L.	11·8	1·5	71·2
Refined wheat flour	,, ,,	11·0	0·9	74·1
PULSES				
Gram	Cicer arietinum, L.	17·1	5·3	61·2
Black gram	Phaseolus radiatus, L.	24·0	1·4	60·3
Cow-pea	Vigna catjang, Walp.	24·6	0·7	55·7
Field bean, dry	Dolichos lablab, L.	24·9	0·8	60·1
Green gram	Phaseolus Mungo, L.	24·0	1·3	56·6
Lentil	Lens esculenta, Moench.	25·1	0·7	59·7
Peas, dried	Pisum sativum, L.	19·7	1·1	56·6
Pigeon pea	Cajanus indicus, Spreng.	22·3	1·7	57·2
Soya been	Glycine max, Merr.	43·2	19·5	20·9

F_1 .

tuents in different kinds of food-materials and values materials in calories.

Calorific value per 100 gms.	Minerals			Carotene (International Vitamin A units per 100 gms.)	Vitamin B_1* (International units per 100 gms.)	Vitamin B_2*	Vitamin C Mgs. per 100 gms.	Remarks
	Calcium (ca) %	Phosphorus (p) %	Iron mgs. (Fe) %					
6	7	8	9	10	11	12	13	14
360	0·05	0·35	8·8	220	110	Poor	0	
365	0·03	0·28	6·2	136	75	Poor	0	
334	0·03	0·29	6·3	54	195	0	0	
342	0·01	0·33	2·1	0	0	0	0	
336	0·01	0·33	5·7	Trace	0	0	0	
351	0·01	0·17	2·2	4	60	Poor	0	
348	0·01	0·11	1·0	0	20	0	0	
328	0·02	0·36	7·1	Trace	0	Poor	0	
346	0·05	0·32	5·3	108	180	+	0	
349	0·02	0·09	1·0	0	0	0	0	
361	0·19	0·24	9·8	316	100	++	0	With outer husk
350	0·20	3·37	9·8	64	140	++	0	Without outer husk
327	0·07	0·49	3·8	60	0	++	0	
347	0·06	0·45	2·0	Trace	0	0	0	
334	0·14	0·28	8·4	158	155	++	0	With outer husk
346	0·13	0·25	2·0	450	150	+	0	
315	0·07	0·30	4·4	0	150	0	0	
333	0·14	0·26	8·8	220	150	++	0	Without outer husk
432	0·24	0·69	11·5	710	300	++	0	

Name of food-stuff	Botanical name	Protein percent	Fat (Ether Extracts) percent	Carbo-Hydrate percent
1	2	3	4	5
LEAFY VEGETABLES				
Cabbage	Brassica cleracea, var. capitata, L.	1·8	0·1	6·3
Cauli flower	Brassica oleracea var. botrytis, L.	3·5	0·4	5·3
Fenugreek	Trigonella foenum-graecum, L.	4·9	0·9	9·8
Bengal Gram leaves	Cicer arietinum, L,	7·0	1·4	11·7
Knolkhol	Brassica cleracea var. caulocarpa, L.	1·1	0·2	5·9
Safflower leaves	Carthamus tinctorius, L.	3.3	0·7	5·1
OTHER VEGETABLES				
Brinjal	Solanum melongena, L.	1·3	0·3	6·4
Bitter gourd	Memordica charantia, L.	1·6	0·2	4·2
Cucumber	Cucumis sativus, L.	0·4	0·1	2·8
Snake gourd	Trichosanthes anguina, L.	0·5	0·3	4·4
Broad beans	Dolichos lablab, L var. lignosus, Prain.	4·5	0·1	10·0
Cluster beans	Cyamopsis psoralioides, DC.	3·7	0·2	9·9
Lady's finger	Hibiscus esculentus, L.	2·2	0·2	7·7
Peas, green (English)	Pisum sativum, L.	7·2	0·1	19·8
Tomato, green	Lycopersicon esculentum, Mill.	1·9	0·1	4·5
Tomato, ripe	,, ,,	1·0	0·1	3·9
Chillies, green	Capsicum, sp. L.	2·9	0·6	6·1
Chillies, dry	,, ,,	15·9	6·2	31·6
Drumstick	Moringa oleifera, Lam.	6·7	1·7	13·4

F—(*Contd.*)

Calorific value per 100 gms.	Minerals			Carotene (International Vitamin A units per 100 gms.)	Vitamin B_1* (International units per 100 gms.)	Vitamin B_2*	Vitamin C Mgs. per 100 gms.	Remarks
	Calcium (ca) %	Phosphorus (p) %	Iron mgs. (Fe) %					
6	7	8	9	10	11	12	13	14
33	0·03	0·05	0·8	2,000	50	0	124	
39	0·03	0·06	1·3	38	110	0	66	
67	0·47	0·05	16·9	3,860	70	0	0	
87	0·34	0·12	23·8	0	0	0	0	
30	0·02	0·04	0·4	36	0	0	85	
40	0·18	0·06	7·6	5,500	0	0	0	
34	0·02	0·06	1·3	5	15		23	
25	0·02	0·07	2·2	210	24	Poor	88	
14	0·01	0·03	1·5	Trace	30	0	7	
22	0 05	0·02	1·3	160	0	0	Trace	
59	0·05	0·06	1·6	0	0	0	12	
56	0·13	0·05	5·8	330	0	0	49	
41	0·09	0·08	1·5	58	21	+	16	
109	0·02	0·08	1·5	139	120	0	9	
27	0·02	0·04	2·4	320	23	0	31	
21	0·01	0·02	0·1	320	40	0	32	
41	0·03	0·08	1·2	454	0	0	111	
246	0·16	0·37	2·3	576	0	0	51	
96	0·44	0·07	7·0	11,330	70	0	220	

Name of food-stuff	Botanical name	Protein percent	Fat (Ether Extracts) percent	Carbo-Hydrate percent
1	2	3	4	5
ROOTS AND TUBERS				
Carrot	Daucus carota, L.	0·9	0·1	10·7
Potato	Solanum tuberosum, L.	1·6	0·1	22·9
Sweet potato	Ipomœa batatas, Lam	1·2	0·3	31·0
SPICES				
Coriander	Coriandrum sativum, L.	14·1	16·1	21·6
Mint	Mentha arvensis, L.	4·8	0·6	8·0
Onion	Allium cepa, L.	1·2	0·0	11·6
Garlic	Allium sativum, L,	6·3	0·1	29·0
Ginger	Zingiber officinale, Roscœ.	2·3	0·9	12·3
Tamarind	Tamarindus indica, L.	3·1	1·2	66·5
Turmeric	Curcuma longa, L.	6·3	5·1	6·4
NUTS AND OIL-SEEDS				
Coconut	Cocos nucifera, L.	4·5	41·6	13·0
Walnut	Juglans regia, L.	15·6	64·5	11·0
Almond	Prunus amydalus, Baill	20·8	58·9	10·5
Groundnut	Arachis hypogæa, L.	26·7	40·1	20·3
FRUITS				
Banana	Musa paradisiaca, var. Sapientum, L.	1·3	0·2	36·4
Dates (Persian)	Phœnix dactylifera, L.	3·0	0·2	67·3
Figs	Ficus carica, L.	1·3	0·2	17·1
Guava (country)	Psidium gujava, L.	1·5	0·2	14·5

F—(*Contd.*)

Calorific value per 100 gms.	Minerals			Carotene (International Vitamin A units per 100 gms.)	Vitamin B_1* (International units per 100 gms.)	Vitamin B_2*	Vitamin C Mgs. per 100 gms.	Remarks
	Calcium (ca) %	Phosphorus (p) %	Iron mgs. (Fe) %					
6	7	8	9	10	11	12	13	14
47	0·08	0·03	1·5	2,020 to 4,300	60	0	3	
99	0·10	0·03	0·7	40	20	++	17	
132	0·02	0·05	0·8	10	0	++	24	
288	0·63	0·37	17·9	1,570	0	0	Trace	
57	0·20	0·08	15·6	2,700	0	0	0	
51	0·18	0·05	0·7	0	40	0	11	
142	3·03	0·31	1·3	0	0	0	13	
67	0·02	0·06	2·6	67	0	0	6	
287	0·17	0·11	10·9	100	0	0	3	Pulp only
349	0·15	0·28	18·6	50	0	0	0	
444	0·01	0·24	1·7	Trace	Trace	Poor	1	
687	0·10	0·38	4·8	10	150	0	0	
655	0 23	0·49	3·5	Trace	80	0	0	
349	0·05	0·39	1·6	63	300	+	0	
153	0	0·05	0·4	Trace	50	0	1	
283	0·07	0·08	10·6	600	30	+	Trace	Preserved fruits
75	0·06	0·03	1·2	270	0	0	2	
66	0·01	0·04	1·0	Trace	0	0	299	

Name of food-stuff	Botanical name	Protein percent	Fat (Ether Extracts) percent	Carbo-Hydrate percent
1	2	3	4	5
Jack fruit	Artocarpus integrifolia L.	1·9	0·1	18·9
Jambu fruit	Eugenia jambolana, Lamk.	0·7	0·1	19·7
Lemon	Citrus Medica Var. limonum, L.	1·0	0·9	11·1
Lime	Citrus Medica Var. acida, L.	1·5	1·0	10·9
Mango, green	Mangifera indica, L.	0·7	0·1	0·8
Mango, ripe	,, ,,	0·6	0·1	11·8
Orange	Citrus aurantium, L.	0·9	0·3	10·6
Papaya, ripe	Carica papaya, L.	0.5	0	9·5
Pomegranate	Punica granatum, L.	1·6	0	14·6
Tomato, ripe	Lycopersicon esculentum, Mill.	1·0	0·1	3·9

Name of food-stuff	Protein percent	Fat (Ether Extracts) percent	Carbo-hydrate percent	Calorific value per 100 gms.
1	2	3	4	5
FLESH FOODS				
Crab (muscle)	8·9	1·1	3·4	59
Egg (Fowl)	13·3	13·3	0	173
Mutton (muscle)	18·5	13·3	0	194
MILK & MILK PRODUCTS				
Milk (cow's)	3·3	3·6	4·8	65
Milk (Buffalo's)	4·3	8·8	5·1	117
Curds	2·9	2·9	3·3	51
Butter milk	0·8	1·1	0·5	15
MISCELLANEOUS FOOD STUFFS				
Sweet *Toddy*	0·1	0·2	14·3	59
Gul	0·4	0·1	95·0	383
Sugarcane juice	0·1	0·2	9·1	39

* Health Bulletin No. 23 by Dr. W. R. Aykroyd, 1938. "No international it has been found, necessary to adopt the older method of reckoning values + means that the vitamin is present but not in large amounts."

F—(*Contd*).

Calorific value per 100 gms.	Minerals			Carotene (International Vitamin A units per 100 gms.)	Vitamin B_1* (International units per 100 gms.)	Vitamin B_2*	Vitamin C Mgs. per 100 gms.)	Remarks
	Calcium (ca) %	Phosphorus (p) %	Iron mgs. (Fe) %					
6	7	8	9	10	11	12	13	14
84	0·02	0·03	0·5	540	0	0	10	
83	0·02	0·01	1·0	0	0	0	0	
57	0·07	0·01	2·3	Trace	0	0	39 (Juice)	
59	0·09	0·02	0·3	26	0	0	63 (Juice)	
39	0·01	0·02	4·5	150	0	0	3	
50	0·01	0·02	0·3	4,800	0	Poor	13	
49	0·05	0·02	0·1	350	40	0	68	
40	0·01	0·01	0·4	2,020	0	0	46	
65	0·01	0·07	0·3	0	0	0	16	
21	0·01	0·02	0·1	320	40	0	32	

Minerals			Vitamin A International units per 100 gms,	Carotene International units per 100 gms.	Vitamin B_1 (International units per 100 gms)	Vitamin B_2*	Vitamin C Mgs. per 100 gms.	Remarks
Calcium (ca) %	Phosphorus (p) %	Iron mgs. (Fe) %						
6	7	8	9	10	11	12	13	14
1·37	0·15	21·2	Trace	1,300	0	0	0	
0·06	0·27	2·1	1,197	1,000	0	0	0	
0·15	0·15	2·5	30·8	Trace	60	0	0	
0·12	0·09	0·2	180	Trace	0	++	0	
0·21	0·13	0·2	162	Trace	0	0	0	
0·12	0·03	0·8	130	Trace	++	++	0	
0·03	0·09	0·3	Trace	0	0	++	0	
0·15	0·01	0·3	0	0	0	Poor	0	
0·08	0·04	11·4	0	280	0	0	0	
0·01	0·01	1·1	0	10	0	0	0	

unit has yet been established for Vitamin B_2 or any of its components and by means of signs. +++ indicates a very rich source; ++ a good source;

APPENDIX G

Glossary Of Technical Terms

Indian coins

Rupee	...	Rupee has exchange value of one shilling and 4 pence
Anna	...	One sixteenth of a rupee; Exchange value of $1\frac{1}{8}$ pence
Pie	...	One twelfth of an anna

English coins

Pound	...	Equivalent to 15 rupees
Shilling	...	One twentieth of a pound
Pence	...	One twelfth of a shilling

				£.	s.	d.
15 Rupees			=	1	0	0
1,00,000 Rupees	=	One lakh Rs.	=	6,666	13	4
100 lakh Rs.	=	10 million Rs.				
	=	one crore Rs.	=	6,66,666	13	4

Weights And Measures

Pound	...	Equivalent to 16 ounces
100 grammes	=	3·5 ounces (avoirdupois)
1000 ,,	=	2·2 pounds
28·4 ,,	=	1 ounce
Sq. mile	...	Equivalent to 640 acres
Acre	=	40 gunthas.
Guntha	=	1,089 sq. feet
Deccan	...	Tract of Bombay presidency: Ahmednagar, Nasik, Poona, Satara and Sholapur districts
District	...	Revenue division or a collectorate

Taluka, Peta or Mahal	...	Local revenue division of a district
Jirayat	...	Rain-fed; not irrigated
Bagayat	...	Irrigated
Kharif season	...	Monsoon season
Rabi season	...	Winter season
Maval	...	Hilly eastern tract of the Desh, getting sufficient *kharif* rainfall
Desh	...	The Desh tract comprises the eastern parts of Nasik, Poona, Satara and Belgaum districts, together with the whole of Ahmednagar, Sholapur, Bijapur and almost whole of the Dharwar district
Kumari or shift cultivation	...	Brush wood from certain area is cut and burnt and land ploughed or hand-dug for sowing small millets. After two or four years the land is rested from 6 to 20 years before it is again put to shift cultivation.

Abbreviation

Rs. As. Ps.	...	Rupees, annas and pies
Lbs. ozs. gms	...	Pounds, ounces and grammes
Sq. miles	...	Square miles
% or p. c.	...	per cent

APPENDIX H

Glossary of English, Botanical, Marathi and Hindustani names

English	Botanical name	Marathi	Hindustani
Almond	Prunus amygdalus, Baik	Badam	Badam
Banana, (plantain)	Musa paradisiaca, var. sapientum, L.	Kele	Kela
Bitter gourd	Memordica charantia, L.	Karle	Karela
Black gram	Phaseolus radiatus, L.	Udid	Urid
Brinjal (Egg plant)	Solanum melongena, L.	Wangi	Baigan, Begun
Broad beans	Dolichos lablab, L. var. lignosus, Prain.	Pavata. Ghevda	
Bulrush millet	Pennisetum typhoideum, Rich.	Bajri	Bajra
Cabbage	Brassica oleracea, var. capitata, L.	Kobi	Band gobhi
Carrot	Daucus carota, L.	Gajar	Gajar
Cauliflower	Brassica oleracea, var. botrytis, L.	Fulwar	Ful gobhi
Chillies	Capsicum, sp. L.	Mirachi	Mirch
Cluster bean	Cyamopsis psoralioides, DC.	Gawar	Guar
Coconut	Cocos nucifera, L.	Narala	Narial
Coriander	Coriandrum sativum, L.	Dhane (seed) Kotmir(plant)	Dhania
Cotton	Gossypium, sp. L.	Kapus	Kapas
Cow-pea	Vigna catjang, Walp.	Chavali	Lobia
Cucumber	Cucumis sativus, L.	Khira, Kakdi	
Dates	Phoenix dactylifera, L.	Khajur	Khajur
Drumstick	Moringa oleifera, Lam.	Shevagyachi Sheng	Soanjna Shevga
Fenugreek	Trigonella foenum-graecum, L.	Methi	
Fig	Ficus carica, L.	Anjir	

APPENDIX H (*Continued*)

Glossary of English, Botanical, Marathi and Hindustani names

English	Botanical name	Marathi	Hindustani
Garlic	Allium sativum, L.	Lasun	Lehsan
Ginger	Zingiber officinale, Roscoe	Ale	Adrak
Gram	Cicer arietinum, L.	Harbhara	Chana
Great millet	Andropogon sorghum, Brot.	Jowari	Juar
Groundnut	Arachis hypogaea, L.	Bhuimug	Bhuni--munghphali
Grape	Vitis vinifera, L.	Draksha	Angur
Green gram	Phaseolus mungo, L.	Moog	
Guava	Psidium gujava, L.	Peru	Amrud
Horse gram	Dolichos biflorus L. Dolichos uniflorus, Lamk	Hulga	Kulthi
Indian bean	Dolichos lablab, L.	Walor Pavta	Wal
Jack fruit	Artocarpus integrifolia, L.	Fanas	
Jambul	Eugenia jambolana, Lamk Syzigium jambolanum	Jambhul	
Knolkhol,	Brassica oleracea, var. caulocarpa, L.	Navalkol	Kohalrabi
Lady's finger	Hibiscus esculentus, L.	Bhendi	Bhindi
Lemon	Citrus medica var. limonum, L.	Limbu	Nimbu
Lentil	Lens esculenta, Moench	Masur	Masur
Lime	Citrus Medica var. acida, L.	Limbu	Neebu
Maize	Zea Mays, L.	Maka	Makai or Makk
Mango	Mangifera indica, L.	Amba	Am
Mint	Mentha arvensis, L.	Pudina	Pudina
Niger seed	Guizotia abyssinica, cass.	Karale	

APPENDIX H (*Continued*)

Glossary of English, Botanical, Marathi and Hindustani names

English	Botanical name	Marathi	Hindustani
Onion	Allium Cepa, L.	Kanda	Pyaz
Orange	Citrus aurantium, L.	Naringa	Naring
Papaya	Carica papaya, L.	Papai	Papaya
Potato	Solanum tuberosum, L.	Batata	Alu
Peas	Pisum, sativum, L.	Vatana	Matar
Pigeon peas	Cajanus indicus, Spreng. Cajanus cajan, Millsp.	Tur	Arhar
Pomegranate	Punica granatum, L.	Dalimba	Anar
Rala	Setaria italica, Beauv	Rala	
Rice (paddy)	Oryza sativa, L.	Bhat	Chaval
Safflower	Carthamus tinctorius, L.	Kardai	
Sava	Panicum milliare, L.	Sava	
Snake gourd	Trichosanthes anguina, L.	Padval	
Sugarcane	Saccharum officinarum, L.	Oos	Ganna
Sweet-potato	Ipomoea Batatas, Lam.	Ratali	Shakar quand
Tamarind	Tamarindus indica, L.	Chinch	Amali
Tobacco	Nicotiana Tabacum, L.	Tambakhu	Tamakh
Tomato	Lycopersicon esculentum, Mill.	Belwangi	Vilayati baingan
Turmeric	Curcuma longa, L.	Halad	Haldi
Vari	Panicum miliaceum, L.	Vari	
Walnut	Juglans regia, L.	Akrod	Akrod
Wheat	Triticum, L. sp.	Gahu	Gehum

APPENDIX I

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